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^A
Presented by William Parry Esq.
PRACTICAL ESSAY *Surgeon MP*

ON SOME OF THE PRINCIPAL

Recd. 8/12/57

SURGICAL DISEASES



OF



INDIA.

BY

F. H. BRETT, Esq. M. R. C. S. L.

BENGAL MEDICAL SERVICE.

SURGEON TO THE RIGHT HON'BLE THE GOVERNOR GENERAL'S BODY GUARD.

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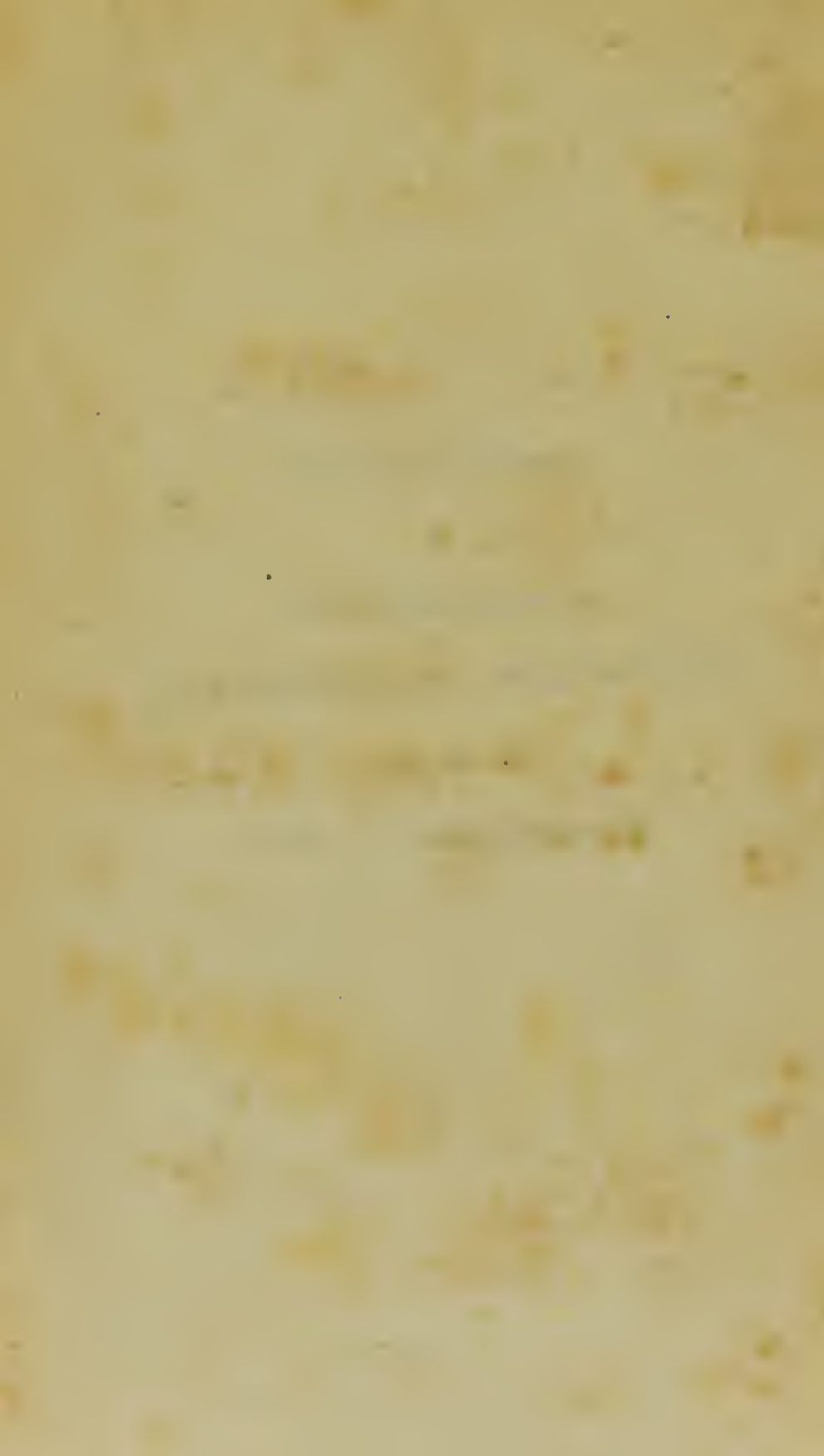
TO

THE RIGHT HONOURABLE

GEORGE, EARL AUCKLAND, G. C. B.

&c. &c. &c.

GOVERNOR-GENERAL OF INDIA.



W. H. P. 1854

PREFACE.

An eminent Professor of Chemistry once declared, "He taught that Science in order that he might learn it." The writer of the following pages might well make a similar assertion, and add, that his Essay will have obtained its object if it should be as useful to the peruser as it has been to himself. Most of those medical officers with whom he has conversed on the subject have felt with him, the want of such a work of reference, a desideratum which is now imperfectly supplied.

Brevity, consistently with the importance of the subjects contained in this volume, has been consulted; and in endeavouring to avoid the imputation of "*Μεγα βιβλιον μεγα κακον*," and also bearing in mind D'Alembert's aphorism "*que l'auteur se tue à alonger ce que le lecteur se tue à abrégér*" the author flatters himself he has kept that medium which it was his object to preserve.

Truth unbiassed by any favorite theory has been the undeviating principle kept in view. Where any peculiarity of practice has been advanced, the objections have been fairly exhibited, leaving the reader to form

his unbiassed judgment on the evidence before him. Facts whether new or old derive a value of authenticity from personal observation. The author's numerous opportunities of treating surgical diseases, and the many thousands of operations which he has had occasion to perform will, he hopes, justify this publication until an abler pen may offer one more comprehensive, and with less defects. In the mean time —————

————— " Si quid novisti rectius istis,
Candidus imperti ; si non his utere mecum."

HOR :—

An attempt has been made towards a more correct classification of many of the diseases treated of, though still admitting of much improvement.

In some of the descriptions of symptoms and characteristics of disease, where originality was so remote as scarcely to be traceable, the author has freely availed himself of the most graphic details given by the most modern writers as nearly as possible in their own words, and due acknowledgement has in all material points been given.

The Plates are from Mr. C. Grant's able pencil, copied, partly either from the author's own hasty and rough sketches, or those of his friends, taken from nature ; also from the best authors at home, and acknowledged likewise in the body of the work. A practice so generally adopted by authors in England, may well be allowed in a country like India, where there is so much difficulty in obtaining *at the moment* the aid of a

graphic pencil to delineate from nature; especially where a medical man's life is an unsettled one.

The confidence of the natives of India, who resort to European hospitals being greatly increased by successful surgical operations, all the information which seemed most essential has been given in that branch of the work. It has been a common observation of Surgeons in England, "that operations on Europeans in India turn out very unfavorably." This is a decided error. Nothing can be more favorable, when the constitution has been well prepared, than the mild and genial season of an Indian spring during the months of February and March, or even the cold season; and this whether we regard the aptness of the system to undergo serious operations, or the rapid healing of wounds.

A thorough acquaintance with the languages of India is most essential to a medical man, for without this he need never hope to obtain the confidence of the natives, or be able to treat their diseases successfully, and he will very rarely be called upon to operate. Hence the origin of an idea very common a few years ago, "that there was scarcely any Operative Surgery in India."

The plan of this work has not been to treat of all the surgical diseases to be met with in India, nor to interfere with that department of Medical Science, pre-occupied by the writer's friend the late Mr. Twinning, but only the most interesting and serious, and such as require professional aid in a *vast majority* of

instances. They are likewise such as impress the natives with the highest respect for a medical officer, inasmuch as they appeal directly to the feelings of all classes, and even tend to reflect credit on British rule. This at least has been the experience of the writer during a number of years in all the populous cities he has had occasion to visit from Calcutta to Lahore.

It is with a view to shew the extensive good that may be effected by any individual member of the medical profession in any of the populous cities of India, that the annual report of the "*Central Hospital and Hospital of Surgery*" in Calcutta, is given in the appendix. The author was the FIRST who laid the foundation of similar institutions in the Upper Provinces of India, in Lucknow, Saugor, Cawnpore, &c., on which others, he is happy to find, have acted.

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CHAPTER I.

ON

INFLAMMATION AND ITS SEQUELÆ.

SEC. I.—PATHOLOGICAL PROEM.

Inflammation, preliminary observations.—When we consider that Inflammation is the morbid antecedent of the most important pathological changes, destructive or otherwise of the human frame;—that it performs the chief part in the cure or progress of almost every accident or disease, involves in its influence the whole of the vital phenomena, affecting more or less the nervous system, and altering or suspending the processes of nutrition,—the exhalant, secreting, absorbent and excreting functions, it justly forms the introduction to most essays on the subject of human disease.—In surgery it is particularly so, and in no part of that science more so, than in that which constitutes the chief portion of the following observations. We will therefore commence this essay with a few pathological remarks on this interesting subject.

What is inflammation? is a question involving those phenomena which have occupied the attention of the

most persevering philosophers. Let us endeavour to arrange what we do know, separated from all ingenious speculation, proceeding analytically in the investigation of—

I. *The Phenomena of Inflammation*, or what is usually termed the proximate cause; for it appears preferable first to define this, so far as we can, instead of adopting the usual plan of commencing with its signs and symptoms.

The following facts have been clearly ascertained by our own observations as well as by the experiments of others, when inflammation is established:—

1st. *Accelerated movement* of the blood, and *increased pulsation* of the vessels leading to the part inflamed.

2nd. *Dilatation* of the vessels of the part and the admission of the red globules of the blood in the capillaries not normally admitting them: these globules appear to be condensed.

3rd. *Retarded movement* in the vessels of the part, leading often to actual stagnation* according to the *intensity* of the inflammation.

4th. *Increased quantity* of blood leading from the *veins* of the part.

1. The *accelerated movement* of the blood and *increased pulsation* of the vessels leading to the parts are ex-

* It appears that the *velocity* of the blood in the diseased parts is less, whilst there is a *larger quantity* sent to the vessels in the same time, the *momentum* therefore of the blood in the diseased parts is greater.—(Vide Writers on mechanics.)

hibited in numerous inflammations, and the sensation of throbbing is chiefly produced thereby. In inflammation of the hand, for example, the radial artery will be observed to be fuller, stronger and harder than the pulse of the opposite wrist. During inflammatory affections of the head or throat the carotids are seen to pulsate with increased force: in a healthy state the pulsations are equal as to strength and frequency, but this equality of power and action ceases under the influence of disease: when inflammation attacks, for instance, the right tonsil the right carotid beats stronger and fuller than the left.* These facts very forcibly established the independent share of the arteries leading to the part, inasmuch as it exists in the *vicinity* of the heart, though the heart at that stage of the inflammation had no share in it. But the increased vital action of the arteries leading to the part must be considered as a consequence rather than the proximate cause itself of inflammation.†

2. With reference to the *dilatation* of the capillaries of the part, and admission of the red globules. The hypothesis of Hunter is that they possess a *power* of dilatation, and the other general theory is that they are in a state of debility, or as it has been designated by others *passive relaxation*.‡

From microscopic observations both in warm and cold blooded animals this dilatation has been clearly ascertained. It is corroborated also by the experiment

* Hastings.

† Phillips, Thompson, Hastings.

‡ Allison.

made upon the ear of a rabbit by Hunter. He produced inflammation in one ear, after it was fully developed he killed the animal, injected the head, and clearly found that the vessels of the inflamed ear were much larger and more numerous than those of the sound ear.

Doctrine of debility.—The objections to the doctrine of debility seem to be the following. Why does a failure of small extent in the capillaries of a vital part strongly excite not only the larger arteries of the part affected, but those of the whole system, while a more extensive debility of the capillaries of an external part excites less increased action in the larger arteries of that part, and often none at all in those of the system in general? Why does inflammation shift from one part to another, when we see no cause either increasing the action of the capillaries of the inflamed part, or weakening those of the part now affected? Why does inflammation arise often in parts only sympathetically affected, and consequently far moved from the offending cause? Why is inflammation so apt to spread to neighbouring parts, without any direct communication of vessels? The agency of the nervous system can alone explain this, and the effects of stimuli and sedatives on the state of the capillaries,* the results of a morbidly excited state of the ganglionic nerves supplying the capillaries of the affected part, or a derangement arising from the unnaturally exalted condition of these nerves on which the functions of the capillaries depend.

* Dr. Hastings.

“ One of the chief enquiries (observes Dr. Copeland in his notes on Richerand’s physiology, p. 551) respecting its nature and physiological relations, is whether this exalted or excited state of these nervous fibrillæ is one of simple excitement or not. Whether the natural functions of these fibrillæ be merely increased above the healthy or ordinary pitch, or whether or not they are also otherwise changed.” When treating on the influence of the nervous system, we shall find that their functions are not only increased but increased *differently* from what we observe in a healthy part from the application of a stimulus, both as respects duration and kind of action.

3. The *retarded movement* in the vessels of the part leading often to actual stagnation of the blood, according to the severity of the inflammation, is evinced by microscopic observations where artificial inflammation has been excited in the translucent parts of animals. Under the influence of stimuli an increased action is first observed to take place, followed afterwards by *dilatation*, when the state of inflammation may be said to be fairly established. The movement of the blood soon becomes retarded. The blood in the neighbouring capillaries appears to incline sometimes even backwards. As the blood stagnates in the vessels of the most inflamed parts it gradually concretes in irregular masses in which the globules are no longer distinguishable—vide Thompson’s experiments, pp. 80 to 89.

4. *Increased quantity of blood in the veins leading*

from the part.—If venesection be performed in any of the vessels *leading from* an inflamed limb, three times the quantity of blood can be extracted in the same time than could be from the opposite sound limb, clearly establishing the fact of increase of blood in it. This may be accounted for by the difficulty of the red globules of the blood threading their way through the minuter capillaries, and advancing to the veins before reaching the network of the extreme capillaries, by a retrograde movement as observed by Kalkbrunner.

Theories of inflammation.—As none of our experiments, aided by the most powerful microscopic means hitherto possessed, have enabled us to discover the actual condition of the extremities of the capillaries, there is no occasion to admit the hypothesis of constriction or *spasm* of the extreme vessels,* the increased momentum of blood *to* the part, and the increased quantum of blood *in* the part seem sufficient to account for all the phenomena, and the transudation *from*, and rupture of the vessels when they can dilate no more to their contents, appear also sufficient to account for the different effusions of serum, fibrine and blood.

Theory of viscosity.—The doctrine of Boerhaave may be briefly stated. He supposed the obstruction in the minute vessels to be owing to *viscosity* of the blood occasioned by heat, diarrhœa, perspiration, or whatever could be supposed capable of separating the more fluid parts of the blood, and rendering it *viscid*; or the ad-

* Currie.

mission of certain descriptions of larger globules plugging up the small vessels which he termed an "Error loci." It is a sufficient reply to the hypothesis of viscosity, that if it were admitted, it would exist in the whole of the blood, and would affect every part of the body alike. Inflammation however comes on suddenly without any such causes. The "Error loci" or the admission of the red globules where they ought not to be, must be acknowledged as a fact, though not exactly in the sense in which it was intended by Boerhaave.

Concluding observations.—Hitherto all efforts have been unsuccessful in tracing further the secrets of nature in what is termed the "theory" of inflammation. Microscopical experimentalists have come to the most opposite conclusions. All we know is that the seat of inflammation is in the capillary vessels, and that it is seated in the same vessels which carry on the healthy processes of nutrition, secretion, and absorption. Various instruments have been allotted to this process. Some physiologists insist with Heuson, Soemmering, Bichat and others upon the existence of "Subordinate sets of capillaries allotted to each function;" whilst others contend, with Richerand, Magendie, Prochaska, Mascagni and others, that they take place "through the medium of *lateral pores* in those capillares which communicate directly between the arteries and veins." Although either of these may be a sufficient medium through which the processes are carried on, it is impossible for either to be demonstrated to the sense of

vision. It is not improbable that both species of organization exist to a greater or less extent in different textures and secreting organs. As we have not yet been able to ascertain in the *healthy* state the difference of structure and action of these minute vessels, we need not be surprised that this difference in disease has hitherto eluded our most persevering efforts. Our ignorance is sufficiently accounted for by the fact which we have ourselves partly confirmed by actual experiment with the microscope in common with some of our ablest Physiologists, viz,—that by magnifiers of 500 diameters the rapidity of the motion of the blood is such as to cause a species of vertigo to the observer, and that the globules are no greater in magnitude than a pin's head even when beheld through the medium of magnifiers of a hundred diameters!

II. The *symptoms* of *Inflammation*. Among the four prominent characteristics may be noticed.

I. Pain.—This in the first instance is slight, and increases gradually. It is augmented by pressure or by any attempt to move the part. The functions of the inflamed organ are suspended in consequence.

The sensation of pain, though generally attendant on inflammation is more frequently felt in the external surface of the body, where the nerves of common sensation exist, than in internal inflammatory affections, though there are considerable varieties in this respect as to the nature, extent &c. of the inflammation.

The sensation of pain accounted for.—The cause of

this sensation must be attributed to the unnatural state of the nerves; and perhaps the distention or pressure in some cases accounts for the sensation. It may be owing either to the degree of change with which the influence of the nervous fibrillæ, and through it the action of the capillaries, are imbued, or it may arise in consequence of the ganglionic system of nerves communicating the disordered excitement which has commenced in them to these cerebral nerves with which they are associated in the textures: for the ganglionic nerves being plentifully distributed to the capillary vessels in every part and tissue of the body, must consequently communicate freely, and come closely in contact with the sentient or voluntary class of nerves, especially in those textures which are abundantly supplied with them. By means of this connection, the excitement is still further increased by the derangement of the capillaries which the former nerves induce. But this phenomenon of inflammation may not result exclusively in the one manner or in the other. It may take place in both ways in the same part, or in the one or the other more or less partially. In those viscera which are imperfectly supplied with the cerebro-spinal nerves, the first explanation may be adopted. Indeed in these textures very considerable inflammation may exist without any other modification of pain than uneasy sensation being felt; whereas in the other organs, whose supply of cerebro-spinal nerves is considerable, the second explanation may be entertained; whilst in some viscera

both modes of accounting for this morbid manifestation may be resorted to. But whatever manner of explanation should be adopted according to the distinction just now stated, it ought not to be forgotten that this particular manifestation of disease is modified throughout its manifold grades by the texture of the part affected, and by the exciting and other causes to which it is indebted for its existence and progress.

According to this view of the subject, it will be observed that the pain of inflammation may be considered as originating in, or caused by, the condition of the particular influence possessed or function performed by the fibrillæ of the ganglionic system of nerves,—as a state of these nerves producing deranged action of the capillaries to which they are distributed, and exciting or otherwise disturbing the sensibility and functions of the other class of nerves with which they become associated in many of the textures; whereas the most acute pains, those which are not necessarily attended with inflammation, and very seldom give rise to it—as those accompanying tic douloureux, trismus, the various forms of spasmodic diseases, and some other painful disorders which it is unnecessary to enumerate, originate exclusively in the fibrillæ of the cerebro-spinal nerves. This appears to be an important and fundamental distinction in pathological research. It accounts for a very frequent phenomenon, namely, the presence of the most violent pain when there are no appearances of inflammation either during its existence or after its subsidence. It shews also that

with the exception of the countenance and one or two other parts, excitement commencing in the cerebro-spinal or sentient nerves has but little immediate influence upon the capillary circulation; and it also points out that whatever influence these nerves may possess over the circulation and the vital phenomena allied to it, it is only by means of exciting the ganglionic nerves distributed to the structure of the part, and to the blood vessels ramifying in it, that any such influence can be exerted. This, it might be shewn, were it necessary to speculate respecting final causes, is a provision requisite to the preservation of the textures, and consequently of the animal body; for if the circulation throughout the different textures and organs were *immediately* under the dominion of the sentient nerves, and removed from that of the ganglionic we should have not only all the phenomena which more strictly belong to it, but all the vital manifestation of nutrition, secretion, animal heat, &c. which are under the influence of the ganglionic system subjected to continual derangement from the various impulses of the will and passions. As these functions, on which the preservation of the individual depends, are under the dominion of another and a less fluctuating influence, they are less endangered by the numerous causes of change by which they are constantly surrounded, and with which they hold frequent communication. But although the functions which are immediately vital are those that belong to the province of this system, they may be acted upon either

generally or partially, through the medium of the nervous system of relation or of animal life, which system has its own particular functions to perform; and these occasionally exert no mean influence over those of the former class.*

Parts which suffer acutely when inflamed.—Parts not naturally possessing much sensibility, as tendon, ligament, cartilage, bone and membrane become exceedingly painful when inflamed owing to the resistance opposed to the extension of their vessels as well as to the effusion by which they naturally relieve themselves.

The brain itself the centre of the cerebro-spinal system presents a remarkable exception under inflammation of its substance.

2. *Swelling or congestion how produced.*—Congestion, or tumefaction which exists in most inflammations would appear to depend on distention of the smaller vessels which are so numerously distributed in the part, and on the increased quantity of blood. Subsequently the effusions and depositions increase the swelling.

The swelling does not present the same character throughout. In the immediate seat of the intense inflammation, the swelling is firm from the deposition of lymph. In the vicinity it is œdematous from serum; generally the greater the resistance afforded the less the effusion.

Such a result, though a salutary effort of nature en-

* See Copeland's notes on Richerand's physiology, pp. 552, 553.

dangers the functions or structure of the organ in a ratio to its importance in the economy; in a vital organ being attended with the most serious consequences.

3. *Redness*.—The redness is attributable to the admission of coloring matter of the blood vessels not normally conveying red globules. It is of that color which we may suppose to be produced by the presence of a greater quantity of arterial blood, being of a very bright scarlet or crimson hue. It is greatest in the immediate seat of the diseased action, and is gradually shaded off towards the sound parts.

4. *Increased temperature*, exists probably to the extent of some degrees, in every case beyond the ordinary temperature of the part but not exceeding the natural temperature of the blood on any occasion, which varies from 98 to 100 deg. of Fahrenheit's thermometer. Hunter carefully investigated this point. He excited inflammation in the cavity of the chest, in the vagina and rectum of animals but he never could produce a higher temperature than that of the blood, however intense the degree of inflammation excited. After operating on a case of Hydrocele, Hunter introduced the bulb of a thermometer and found it 92 deg. on the following day he found that it had risen to $98\frac{3}{4}$. This experiment appeared hitherto conclusive as to the increase of temperature being merely owing to the presence of a larger quantity of blood which being greater in the general circulation than in the *part* the *sensation* of heat is accounted for.

Altered state of the nutritive phenomena.—We cannot doubt however that the altered state of the nutritive phenomena in the capillaries of an inflamed part is attended with chemical changes, that there is a high degree of vital excitement in which the nervous system is greatly concerned, that there is friction of the different parts, and rolling of the globules one upon another. We know that many of these chemical changes produce elevation of temperature. From recent experiments of Brodie on decapitated animals, by artificial respiration, the preservation of temperature would not appear to be explained entirely by combustion, or mere chemical principles. The nervous system, and the principle of life appear to have been too much overlooked, as well as the share which the capillaries have in the elaboration of heat and soliciting an afflux of blood to the affected part. The experiment so far as it went, was valuable, though without it our *a priori* reasoning would have led to such an inference.

Synthetical conclusion.—These phenomena are permanent in the part, and taken *synthetically* constitute inflammation. Their presence separately being inadequate to establish its existence.

III. *Influence of the nervous system.*—The nervous system therefore,—there can be little doubt,—is greatly concerned in the production of inflammation. It is probably through the ganglionic portion of this system that the causes of inflammation act in the vessels of the part. The analogy of the powerful influence of mental emo-

tions on the capillary circulation is illustrative of this, through the medium of the cerebro-spinal system acting on the ganglionic fibrilæ of the capillaries. The influence of external causes in producing internal inflammations, the irritation and serious affection on internal organs occasionally resulting from the *shock* of severe injuries and operations, metastasis, and the powerful influence of sympathies are inexplicable, but through the instrumentality of the ganglionic system of nerves which ramify so extensively and penetrate the coats of the arteries and even the coats of the minutest arterial capillaries.

Illustration from the play of the passions in the chameleon.—The play of the passions on the capillary circulation is well exemplified in the chameleon. If alarmed it becomes of a pale green and light yellow and if irritated by the presence of another it suddenly changes to dark brown and green. It is entertaining to witness the variety of shades which occur when the animal is watching its prey, darting its immense tongue towards it or devouring it. Its Indian designation “bara rung” or “bara runga” literally translated, twelve colors, is no inappropriate term. These phenomena are distinct from those various shades of color produced by reflection of light being equally observable in the sun as in the shade.

Vital contractility of the capillaries.—The capillaries possess a high degree of vital irritability and elasticity whereby the motion of the fluids in them, the process

of secretion, and other local phenomena are importantly affected and this at a point where it was so requisite, as the force with which the blood is propelled by the heart is nearly expended before it reaches these minute terminations. This is not only supported by experiments, but is also countenanced by an extensive series of phenomena presented during disease in the human subject. Irregular determinations of blood and increased pulsation of arteries leading to inflamed parts illustrate this, and the nervous system is the only agent to which it can be attributed.

The *lædentia* and *juvantia* would seem to confirm the idea of increased vital action when the capillary vessels are irritated by the direct application of local stimulants such as heat, or through the nervous system as in blushing: a determination of blood to the part follows. By this beautiful resource of nature the action of one part of the capillaries may be increased without affecting the general circulation and by this action on certain classes of capillaries it is that many remedies act so beneficially in removing diseases. Such an effect is often owing to the determination of blood to the part and the consequent increase of its functions, as is exemplified in the action of diuretics &c.

Analogical illustrations.—This vital action would seem to be most happily compared by Kalkbrunner to that which takes place from mental causes and sympathetic influences through the nervous system on the erectile tissues; the sexual and mammary, for example, which

he has therefore denominated "inflammatory erection." There can be no doubt that the *incipient* stage of inflammation resembles these. Blushing is another illustration of inflammatory erection. There are remarkable meshes of ganglionic nerves distributed around the carotid artery and there is an intricate connection of the cutaneous nerves of the face and neck with important nerves of the body. In general the greater such distribution to arteries the greater the facility of increased flow of blood from mental emotions, sympathies or instincts. The mucous membrane of the bowels is another illustration; mental impressions, as fear, occasioning a sudden determination and increased secretion from the mucous coat followed by increased peristaltic action. These undoubtedly are not inflammations, but they closely approximate in character though not in degree. The same may be produced by irritants in any part of the body, though the actual establishment of inflammation depends upon the *intensity* of these causes.

One of the chief inquiries respecting its nature and physiological relations, says Dr. Copeland, is whether this exalted or excited state of these nervous fibrillæ is one of simple excitement or no,—whether the natural functions of these fibrillæ be merely increased above their healthy or ordinary pitch, or whether or no they are also otherwise changed. In the definition, we said morbidly or unnaturally excited, thereby indicating that the functions or influence of these nerves are not only simply increased, but also increased *differently* from

what we observe in a healthy part, from the application of a stimulus, both as respects duration and kind of action.

a. As respects the duration of this exalted state. In the vascular phenomena displayed by blushing or by the application of a gentle stimulus, the effects soon subside after the removal of the exciting cause ; because the nervous influence exerted on the capillaries is simply increased without the mode or habitude of operation being changed. But before we can farther explain the duration of excitement, we must secondly inquire into its *kind*.

b. When a stimulus or irritant is applied to a part, its action seems to be first upon the ganglionic fibrillæ supplying the capillaries. The vital influence of these fibrillæ being excited, the actions of the capillaries which they supply are consequently increased. There is, however, every reason to suppose that the increase of this influence is not simple, that it is not only changed in degree, but also modified in kind. The irritant seems to impress the nervous fibrillæ of the part, or of the system more generally, in such a manner as to prevent it from returning to its natural state for a very considerable time, or even at all ; the excited action is induced, it continues, and the longer it continues, the less is it disposed to return to its healthy condition. But wherefore does the excitement continue ? To this we may answer, either because the irritating or exciting cause continues to operate by its actual presence or more frequently because

the impression made by it, while it changed the degree of nervous influence, also modified its state of existence and kind of operation on the vessels themselves and the fluids which they contain. It is, therefore, owing to the impression of the causes and changes thereby produced in the kind as well as degree of influence exerted by the nervous fibrillæ, that we are to impute, 1st, the duration of the excitement; and 2ndly, the different phenomena which capillary derangements or inflammations present.

Deductions.—From what has been said it will be seen, that we consider inflammation, in its various forms and stages, to originate in, and to depend upon, the altered kind and degree of influence which the ganglial system of nerves exerts on the capillaries of this part; that whenever this influence is greater than natural, the action of the capillaries is greater than natural, and whenever it is below the healthy condition, these vessels are equally deficient in a requisite degree of action; that the *kind* of influence is changed as well as the *degree* of influence; and that as inflammation originates with the nerves supplying the capillaries of the diseased part, it may be considered as a lesion of the functions of these nerves affecting the condition of the capillary vessels, and occurring more frequently in those tissues which are the least supplied with an additional and a compensating influence from the other parts of the nervous system: hence the reason that inflammation is very seldom seen in the muscular structures to which the

cerebral nerves are so plentifully distributed, and hence the probable cause that it so frequently attacks cellular parts, or those which are essentially cellular in their nature and are supplied with ganglionic nerves only.*

IV. *Effects of inflammation.*—The *effects of inflammation*, may be considered both *constitutionally* and *locally*.

I. *Constitutionally*, with reference to the concomitant inflammatory fever and the *altered properties of the blood*.

a. The *inflammatory fever* when present varies in its extent and character according to the structure and importance of the part affected, the nature of the cause, state of constitution, habit, and mode of life of the individual, the functions of the nervous and sanguiferous systems becoming sympathetically disordered and all the secretions diminished or suppressed.

It is most probably through the instrumentality of the nervous system that this sympathetic fever is produced, for the following reasons, 1st,—because it is more readily produced in nervous and irritable subjects. 2ndly. It is peculiar to animals, though actions similar to those which take place in the capillaries of animals are observed in vegetables, and are there also liable to local morbid changes. 3rd.—The febrile affection takes place suddenly. 4th.—Fever unconnected with inflammation can often be traced to causes acting directly on the nervous system. It is unnecessary to

* See Copeland's notes on Richerand's Physiology, p. 551 et seq.

adduce further arguments after what has been said when treating of the influence of the nervous system.

The probable nature of this change would seem to be, the obstruction in the capillaries and increased flow of blood to the heart by the veins, exciting it to re-act. This view is corroborated, 1st, by the effect of obstruction from rigidity of the large arteries, exciting the action of the heart and producing hypertrophy of its muscular substance; 2nd, by the effects of bleeding in the cold stage of fever; 3rd, by the effects of exercise on the heart.*

The heat of the surface, flushing, headache, thirst &c. are thus readily accounted for, when the reaction of the heart is fully established.

The fever subsides with the cessation of the morbid action.

Inflammation with deficient action of the heart, as in Peritonitis, violent injuries, and from certain poisons, is easily explained by these having a direct depressing influence on the vital power of the heart, in addition to the influence of mere local inflammation.

b. The altered properties of the blood, which we proceed to describe under the usual designation of the buffy coat, form of the coagulum &c.

Blood abstracted from living vessels always separates into two parts, the serum and crassamentum. The latter consists of coagulable lymph and red globules. The

* Alison.

red globules, by the latest and most accurate experiments of MM. Prevost, Magendie, Damas and others, consist of two portions, a central white globule consisting of coagulated albumen, and a colored envelope which chemists suppose to be composed of an animal substance in combination with a peroxide of iron. Under inflammation the red globules either from a greater specific gravity, or from a repulsion between their particles and those of the lymph, subside to the bottom of the vessel, leaving a yellowish crust upon the surface termed the buffy coat.—An increased degree of contraction of this crust, its margins receding from the sides of the vessel, makes it, what is termed cupped.

These appearances of the particles of the blood generally bear a tolerable ratio to the degree of inflammatory action; though the buffy appearance is exhibited in the blood taken from pregnant women, and is a criterion of some unusual operation going on in the system. It is observable in the blood drawn from horses after running. But in these instances the blood is seldom cupped. The albumen in the serous part of the blood would appear to be in excess. Blood does not coagulate so speedily when taken from an inflamed part.

The blood under inflammation is redder, and flocculi are seen floating in it. In various diseases, especially in those which are malignant and infectious, when the vitality of the system is much exhausted, as in the advanced stages of typhoid and adynamic fevers, in the true infectious puerperal fevers, and puerperal mania,

in the worst forms of erysipelas and diffusive inflammation of the cellular structures, and in several other diseases particularly when epidemic, or occurring in hospitals, the air of which is vitiated by the crowded state of the sick, and the decomposition of the discharges and secretions, as in lying in hospitals, the blood taken from a vein will often not separate into a distinct coagulum and serous fluid, but will assume the appearance of a straw colored jelly, at the bottom of which jelly the red envelopes of the vessels will be found forming a loose reddish brown or blackish stratum. In such cases, the blood participating in the deficiency of the vital energy of the body and being also, perhaps, deranged from the admixture of hurtful materials with it, which are not duly eliminated by the various emunctories, evinces the lowest grades of vital endowment; the attraction between the globules of the blood being so weak as not to give rise to the exclusion of the watery parts, and permitting the envelopes of the globules to separate speedily, and to form a loose and unadhering stratum over the bottom of the vessel.

Opposite phenomena to the above, result from the increased energy of the vital functions generally, particularly of the vascular system, and of the functions of the nerves which supply it.

Various other states of the blood, arising both from deficient vital energy and consequent inactivity of the functions of those organs which are the emunctories of the vascular system, and from the introduction of hurt-

ful emanations and ingredients into the circulation, and occurring in the course of numerous diseases especially such as are epidemic and febrile might be adduced.*

Vitality of the Blood.—When we consider, not only the above phenomena of the blood exhibited in inflammation, the mode of its coagulation and the phenomena evinced under the microscope, but its active agency in the vital economy even from the very earliest period in the formation and developement of the vessels destined to contain it, its possessing all the elements of the system, the manner of its receiving increase and repairing lost parts, its being the source of all nutrition, and supplying all the organs with materials for carrying on their functions—the existence of vitality in this fluid can scarcely be doubted, or, at least, we must conclude that it participates in the vitality of the body, in the vessels and organs through which it circulates, and that “according to the degree or condition of this vital endowment coagulation and the coagulum are modified in their phenomena and appearances, and the production of the buffy coat promoted or altogether prevented, and that the blood gradually acquires its vital endowments from the time that the secretions mix with the more soluble portions of the chyme and form the nutritious chyle, which also generally presents the phenomena of coagulation although in a less degree”†

* Copeland in his notes on Richerand.

† Copeland.

Dr. Wise in a series of able articles on the Blood which have appeared in the India Journal of Medical and Physical Science for 1839 and '40 has observed that—

“When we view the drop of liquid blood in its primeval state can we suppose, that something called life is a functional effect, when we view its offices and mark its changes in different animals, and states, does not our understanding declare the negative and unhesitatingly conclude that vitality is not the consequence of certain effects, but a primitive *something* attached to the liquid drop, like the natural powers of matter; a something bestowed by consummate wisdom and power, to expand to a beauty of structure and adaptation, that can only be viewed with *wonder and admiration?*”

II. Effects of inflammation.—With reference to the *local* effects of inflammation.

a. The extravasation of Serum.

This effusion from the vessels of the part is obvious in external, and often occurs in internal inflammations, impairing the functions of the parts. This is well illustrated for instance in œgophony, rale crépitant, and œdema glottidis, in effusions into the cavity of the pleura, the cells of the lungs, and the cellular tissue under the mucous membrane of the air passages respectively. It constitutes the chief part of the swelling in external inflammations especially in the surrounding textures.

b. Effusion of lymph.—Effusion of *Lymph* is the result of a more advanced stage of inflammation and

is what constitutes nature's chief means of repairing wounds, ulcers, and injuries, and may, not improperly, be termed, the material of animal organization, and constitutes the chief part of the vital molecule of the embryo of all animal beings. We rely on it for the success of operations for the restoration of lost parts. It becomes organized with great rapidity. The adhesion of contiguous surfaces is effected by it, and occasionally though less frequently, that of mucous surfaces, as in fistula lachrymalis, stricture, and croup; also of the fibrous and synovial membranes. In inflammation of the iris that highly vascular and important structure becomes altered, and the pupil completely closed by effusion of lymph. It is often in long existing closure of the iris from this cause, whilst the eye itself has remained in other respects sound, that one of our most successful operations for artificial pupil is performed. In this country especially, such operations are exceedingly favorable. Hepatization of the spongy tissue of the lungs is caused by this effusion. Its density is increased by the absorption of its more serous parts, and it is often tinged with the coloring matter of the blood, as in the cells of the lungs. Reddish striæ are seen in the lymph thrown out in various parts which eventually become real vessels, ultimately establishing the organization of the part. Sir Astley Cooper* relates an instance of these effects occurring extensively within

* *Lancet*.

24 hours. It generally may be said to vary from 36 hours to several days.

VI. The terminations of inflammation.

a. Resolution may be defined the subsidence perhaps from exhaustion of those vital affections or inflammatory erections of the capillaries produced either as the favorable result of our remedial measures however directed for evacuating the contents of the capillaries or the above enumerated efforts of nature in removing the distention by effusion of their serous or sanguineous fluid and permitting a restoration of the healthy current. The pain becomes less, the fever and other symptoms abate, and the part is restored to its natural size and color :—

b. Theory of suppuration.—Without renewing the obsolete doctrines of dissolution of the solids and fluids &c., Pus must be considered as the result of a changed mode of secretion of the capillaries, both chemical and vital. It has been alledged that we derive no advantage by calling the formation of pus a secretion, for that secretion is a process with the nature of which we are unacquainted. But in answer to this remark we may observe, that in saying that pus is a secretion, or that it is formed by an action analogous to that by which secreted fluids are formed, it is not meant to insinuate that we do, or ever can know, the affinities by which nature forms this substance from the blood. We should be limited greatly in the account to be given of the process of secretion, were we not permitted to assert

that a substance was a secreted fluid, unless we were at the same time able to explain the manner in which secretion is performed. It has been said that secretion is performed only by glandular organs, and that we perceive no glandular structure in the body for the production of pus. But we may remark, that the definition of a secreting glandular part must be taken from its function, and not from its structure; for nothing can be more various than the internal structure of those organs that are denominated glandular secreting organs; they consist sometimes of convoluted vessels, sometimes of follicles or small hollow bags, and sometimes transparent membranes in which neither convoluted vessels nor mucous follicles can be perceived—see Thompson on inflammation.

Experiments of Gendrin and others.—By the recent experiments of Gendrin it would appear that pus is nothing more than the conversion of discolored blood into the purulent state, and he elucidates it by a ligature on a vessel, and exciting the inner coat to inflammation. The globules of the blood nearest the vessels first lose their color, and then gradually assume the purulent character. Microscopical observations of others have demonstrated an effort towards the separation of the coloring matter from the globules. The experiments of Sir E. Home shew also that pus when first secreted does not assume the purulent appearance, but acquires it afterwards on the inflamed surface, requiring in some instances fifteen minutes for its conversion into

purulent matter. Pus is a yellowish opaque fluid and appears on minute examination to possess larger globules than those of the blood. It is composed of serum, fibrine and globules. The serous portion is coagulable by a solution of muriate of ammonia, which no other animal secretion is, and at the same time a production of inflammation.

It appears to be a law in the animal economy, observes Dr. Wise, that not only the vessels secrete their fluids by the vital act, but also that the vitality of the part acts in bringing the secretion to a state of maturity. This is the only way that we can explain the manner in which the different parts of the body are built up, peculiar secretions formed, and injuries repaired. "In infancy the tissues are in an imperfect state of development; by the extremities of arteries the peculiar fluids are secreted, which by the vitality of the parts are changed into their respective tissues, in the same manner as the peculiar secretions are formed, which differs so widely from the circulating fluids. It is in the same manner, that by a certain degree of inflammation, a peculiar thin, clear secretion is formed resembling lymph, and changed by the vitality of the part into pus; which is modified in its nature and properties by the cause and part affected. In a short time it changes to a limpid consistence, or to a fluid the thickness of cream; and from a pale white appearance, to a white, yellow, greenish, or red color; varieties which seem to depend on slight changes in their principal constituents. These changes are of the

same nature, as those which occur in the blood of the ova. When first formed the blood in the yellow membrane is of a transparent appearance in which the globules are formed, and changes from a yellowish to a brown, and then becomes of a red color. It is in the same manner that milk is formed, and it is very probable that the use of the lymphatic glands is to modify their contents by producing globules, and so as to render it in a fit state to be received into the circulation.

As inflammation can always be produced by a certain degree of irritation, so its consequent pus may be produced, and kept up for any time, by producing the necessary degree of inflammation as by an issue, &c. as this inflammation decreases, the secretion becomes of a serous quality. In like manner after an abscess has been opened, it secretes thinner pus than was formed in it when opened, and as the inflammation diminishes, and the cavity contracts serum is evacuated until it heals up.”*

Such is its character under healthy suppurative inflammation. It is not corroding, although its pressure causes ulceration and sloughing of various contiguous textures, neither does it undergo decomposition until exposed for some time to the atmospheric air. It is a protection to exposed surfaces and should never be removed from the surface of granulation. By evaporation of its serous particles it forms a covering or scab favoring cicatrization.

* India Journal of Medical and Physical Science p. 43. 1840.

“ When the inflamed part is highly organized it soon diminishes by the absorption of the contents of the part. When the part affected is not so highly organized, and the inflammation removed with more difficulty, its symptoms continue after the abscess is formed; as around ligaments, bones, &c. In some cases the contents of abscesses are absorbed, and it is probable that the pus is removed in a similar way as when secreted; and thus undergoes a considerable change in its passage to the vessels of the part, and admits of its being absorbed in considerable quantities. Without this change in the properties of the pus the person would probably be always destroyed on its entrance into the circulating system.”*

In unhealthy states of the constitution, the color, consistence, and other qualities of pus are altered. There is a disproportion of the serous parts to the globules, and there is more of the coagulable lymph. There is a greater proportion of the extraneous parts of the blood, such as salts which may perhaps render it corroding. Its tendency to decomposition and putridity is greater. Coagulated blood is in such cases found in it, and sulphuretted hydrogen gas is abundantly generated;—we might observe that sulphuretted hydrogen is always present to a certain extent in pus, though not always evident to the olfactories; the pus from the most healthy ulcers blackens adhesive plaster when applied, and this is owing to its uniting with the lead of the

* Wise.

plaster and forming a black hydrosulphuret of lead. Under decomposition the constitutional irritation is very great, and hence the precaution of Mr. Abernethy in chronic abscesses of giving exit to their contents by a valvular opening, compression and bandaging to avoid the access of *air* to the suppurating sac; a practice which has not been found to be so successful as an *early* and *free* incision, and giving exit *at once* to the whole of the contents of the sac by a counter opening if necessary.

It is by such early incision that chronic abscesses situated deeply in the intermuscular texture and being unattended with pain or inconvenience are prevented from attaining any great size, which having reached, when exposed to the access of atmospheric air, they are attended with alarming constitutional irritation from inflammation and vitiated secretion from the lining membrane of the abscess.

That most pernicious consequences result from the contact of air with such secreting surfaces cannot admit of a doubt. If a covering, for instance, be removed from a part which has been recently deprived of its skin by a blister, a burn, or any other means, a smarting pain is immediately perceived; if this part be covered up from the air, or if it be brought into contact with azotic gas or carbonic acid gas, little or no pain will be experienced; but if on the contrary we apply oxygen gas to the sore or wound, the pain will not only be felt, but it will be much more severe than that which arises from the contact of atmospheric air. These and vari-

ous other facts to the same purpose, were experimentally ascertained by the *late* Dr. Beddoes—"air introduced also in the way of experiment into the cavity of the pleura and peritoneum of quadrupeds, has been found to excite inflammation, and this effect is more speedily produced by oxygen gas than by atmospheric air. Indeed every practitioner knows how necessary it is, in wounds penetrating any of the great cavities, or shut sacs of the body, to exclude the access of atmospheric air; this is a point in practice known to Hippocrates, and which has been particularly insisted upon by Magatus, in his treatise *De Vulneribus*, and by Dr. Munro, in his work on the *Bursæ Mucosæ*.—Thompson *loc : cit.*

Symptoms of the suppurating stage.—When the suppurative stage is likely to occur, the usual symptoms of pain, heat, and redness increase, as well as the febrile symptoms. The irritative fever of suppuration is indeed usually ushered in by *rigors*. This, however, though not an essential symptom is a tolerable criterion. It is more generally present where the suppuration is connected with a vital organ. The part acquires a large size, turns soft, somewhat prominent in the middle, or towards its most depending part; it then acquires a shining appearance, the pain and fever abate, and *fluctuation* becomes sensible to the touch.

Suppuration must be preceded by inflammation of some form or other, although in chronic abscesses under peculiar states of the constitution the inflammatory symp-

toms have been so masked as to lead to the opinion of their spontaneous origin.

In pleurisy and peritonitis lymph mingled with serous effusion appears to constitute the first step towards the formation of pus. The effusion also from a blistered surface, is first serous, and subsequently purulent, and in many rapidly fatal inflammations the secretion is intermediate between lymph and pus. Exposure to the air seems to determine often the formation of pus on the surface of the body which would otherwise have formed lymph. In purulent effusion on the pleural cavity (empyema) as well as in purulent effusion in the latter stages of pneumonia pus is also found mingled with lymph. The degree and nature of the cause have considerable influence in determining suppuration, as in bruised and lacerated wounds, or when parts have been deprived of their vitality by laceration, and which must be removed in the same manner as when a foreign body is in a wound, before adhesion can take place.

Pus may be surrounded by a deposition of lymph as in abscess, or be found mixed with that effusion, as in the cellular tissue, fibrous and synovial membranes, serous cavities, parenchymatous viscera and blood vessels; and it is the characteristic effusion of mucous surfaces.

In non-secreting parts suppuration is more apt to occur quickly, when the inflammation is acute than when chronic; when a part is near the heart than at a distance from it; in children than in adults, and in the adult than in the aged,—glands require longer time to

suppurate than any other organ inflamed in a like degree. In the lungs tubercles are the product of a certain degree of specific inflammation, by which they are softened, and terminate in purulent collections. Tendons do not seem to admit of suppuration."—Dr. Wise.

The cysts, or parietes of abscesses are secreting and absorbing, and subsequently granulating surfaces.

Solvent tendency of pus ; absorption around it.—Pus has a solvent tendency on some textures, illustrated in the brain by *ramollissement*, and is like other effusions of inflammation, attended with absorption, as is exhibited in the enlargement of the cavity of an abscess and the maturation of a pustule of small pox. This process when occurring beyond any salutary purpose is attended with peculiar febrile symptoms of an intermittent character termed hectic.

Hectic fever supervenes under the debility arising from profuse purulent secretion, especially where pus is deposited in vital organs. This constitutional irritation comes on at different periods after the commencement of suppuration owing probably to peculiarities of constitution or to varieties of structure and functions in the organs affected. Hectic fever differs materially not only in its appearances and character, but in the method of treatment which it requires, according to the seat of the organ under suppuration and the importance of its functions in the economy. It is an important question to make, how it happens that in the hectic attendant upon diseased joints, extensive

burns, frost bites &c., and in ill-conditioned wounds succeeding to chirurgic operations, that a generous and nourishing diet, together with wine and cordials is beneficial, whilst in pulmonary and visceral diseases such a regimen has an injurious effect, and (especially in suppuration of the lungs) greatly aggravates the symptoms? The most natural explanation may be found in this—that in pulmonary hectic the stimulating regimen acts injuriously in proportion to the irritability of the constitution and its vicinity to the centre of the vascular system and the vascular structure of the part affected.

c. Ulceration.—The skin, the cellular tissue, the mucous membranes, the bones and cartilages are the structures chiefly liable to this process. The fibrous textures generally resist it, as well as the serous membranes, and the outer coat of the arteries; and the tendency to this ulcerative state is determined by certain specific inflammations, by stimulating and irritating causes, by the contact of foreign bodies, and by such as enfeeble the circulation generally and locally. This consequence of inflammation will receive a further consideration when on the subject of ulcers.

d. The next termination of inflammation requiring our attention is *gangrene*. When effusion from the vessels is inadequate to relieve the distention, and when their obstruction therefrom is so great that the circulation can no longer be carried on, all vitality both in the solids and fluids of the part is soon at an end, or when

from the intensity of the inflammation, or the condition of the patient, from the depending condition of the part inflamed, its distance from the heart, the morbid rigidity of the arteries leading to a part, or from any other cause producing debility of the circulation, gangrene or mortification is liable to take place. Such a result may be determined also by intense cold or heat, chemical agents, poisoned wounds, or violent mechanical injuries, severe gun shot wounds &c., producing disorganization of parts.

The operation of the exciting causes is often favored by general debility of the system. The slightest pressure will sometimes produce it in typhus fever and other adynamic fevers and states of the constitution, and whenever there is an impoverished state of the blood. Mortification is often induced by violent specific inflammations as the pustule of variola and gonorrhœal ophthalmia, the latter frequently terminating in sloughing of the cornea. This circumstance is owing to *strangulation* of the vessels of the cornea from the chemosis, or the elevation and tension of the conjunctiva covering the sclerotica.*

Its destructive inroads on the textures varies with these causes. The vital properties of the blood are entirely destroyed. It loses its color, and acquires a yellowish tinge. The part becomes of a livid hue. Small vesicles filled with a thin foetid serum arise on its surface, and air is felt distinctly within the cellular tissue.

* Tyrrell—Trans. Royal Med. and Chirurg. Soc.

The mode which nature adopts in the reparation of this is as follows—lymph is thrown out; the process of ulceration, and suppuration is set up at the line of contact between the living and dead parts. At this *line of separation* the gangrenous mass becomes detached.

VII. *Remote causes of inflammation.*

I. Inflammation may be directly excited by mechanical or chemical injuries. By wounds of various kinds, by pressure, by the action of strong acids, by pure alkalies, and aerid matters. By animal or vegetable poisons—by the application of cold or moisture, and by various atmospherical changes, acting either directly on the part, as by cold on the air passage; or remotely, as cold and moisture to the feet producing rheumatism or sore throat. Exclusive exertion of an organ will produce inflammation as in the eye, the brain, the lungs &c.

The *predisposition* of the individual rendering him more liable to the action of these direct causes may be thus enumerated.

a. *Peculiarities of organization*, the predominance of certain particular organs or systems of organs, constituting what is termed the sanguineous, the nervous, the lymphatic, and the bilious temperaments.

b. *Idiosyncrasies*.—Particular medicines or articles of food produce a certain effect on some, which they do not on others. A grain of mercury will salivate one person, whilst in others the system can with difficulty be affected even by the largest doses.

c. *Hereditary predisposition.*

Hereditary or acquired *diathesis*, as gout, rheumatism, scrophula; age, sex, climate &c.

These determine the seat of inflammation as well as its character.

In many instances, we cannot trace the application of any cause to the affected organ. Such inflammations are termed spontaneous, but the predisposition is generally traceable.

d. A most powerful *predisposing* cause is *plethora*. Repletion of the sanguiferous system from excess of animal food and fermented liquors.

The inflammatory diseases of Europeans in India especially, are chiefly induced by the highly stimulating diet they use and the little exercise they take, aided by the debilitating circumstances to which they are exposed in this climate; rendering them more liable to the exciting cause of fever—viz. malarious atmosphere.

A *European* on his arrival in India is generally in the highest state of plethora. By such a system of stimulating diet he seldom escapes a severe attack of inflammation shortly after his arrival.

Here we would pause to offer a few remarks respecting *Cadets*. It is much to be regretted that a medical man is not always chosen as superintendant of *Cadets*. We speak from repeated opportunities of personal observation, that many a promising young man has met with an untimely end for want of proper precautions. They stand in absolute want of a man of experience who should pre-

side at their mess, and act the part of a friend, I would almost say of a parent to them, winning them by every kindness and considerate attention, warning them of their dangers, and impressing on their minds the necessity of adopting those habits which are so essential to the preservation of their health and lives in this country. We may adduce an instance among many, still fresh in the recollection of the garrison medical staff. An interesting youth of 16, *an only son*, and heir to a considerable fortune, was induced to go out after *butterflies* during the month of *September*! On returning home he was seized with fever. His young companions were not aware of his danger, some trifling dose of medicine was given, but no medical aid was sent for until the following day; when Dr. Corbyn arrived he found him in a state of insensibility, and in that state he shortly afterwards expired! The superintendant of Cadets knew nothing of his danger and probably had never seen him more than once, on reporting himself, and possibly on one more occasion. Many are seized in a similarly incidious way by cholera, fevers, and other diseases; or the seeds are sown of an injured constitution. No doubt many a promising young man would be saved to his parents and his country by their being under the *especial* care of a medical officer *of experience*, who should be adequately remunerated, and part of whose duty it should be to *have them at his table*, and who, by his unremitting-superintendence, firmness, tempered with kindness and urbanity,

and his interesting himself in their pursuits and tastes might so easily gain an influence over their best feelings, and direct their talents and characters to some useful end.

But to return from this digression.

On convalescence, the same habits are renewed, and he arrives in the upper provinces with his health restored. For the first few years of his residence in India he becomes in high condition especially during the cold season. (We allude particularly to officers and civilians.) But his system, both vascular and nervous is under a constant state of excitement, from the continued in-pouring of nutriment, stimulation and high temperature, and he labours under plethora from *repletion*, as well as plethora from *diminished secretion*. He is on the precipice of disease, and a slight impulse is sufficient to destroy the balance and precipitate him.

Should he survive the repeated attacks to which he is liable his constitution becomes enfeebled, his appetite impaired, his energies diminished, the secretions and excretions scanty, and the skin dark, harsh and dry. He is perhaps dispeptic, and, in a word, his system becomes lowered down to the climate, and he is no longer recognizable as the energetic active European. His muscular system is much reduced. He is the "dried up Indian," with habits and constitution scarcely adapted for his native land. On the other hand, should his constitution still remain of the plethoric tendency, he is gross, corpulent and flabby.

Causes acting primarily on the *nervous system*, even in temperate people, will of course produce a predisposition to inflammation such as indolent habits, confinement indoors, mental exertions and emotions, disordering the digestive organs, weakening the system, and increasing its susceptibility.

Health of Europeans residents in India.—If Europeans cannot adopt their mode of life to a tropical climate but must indulge in habits totally incompatible with such a climate, they should at all events endeavour to convert their food into wholesome nutriment, and preserve the robustness of their frames by practicing athletic exercises, in the cool of the day, and wrestling in imitation of the Pehlwan. It is indisputable that these individuals enjoy an immunity from disease, unknown by others. There are none whose constitutions resist the exciting causes of disease so well, although their blood is abundant and their vascular system vigorous. The few Europeans who have entered thoroughly into the spirit of these exercises return to their native land with vigorous constitutions capable of really enjoying their native country :

The writer has long admired and practiced the calisthenic exercising of the Asiatics, and attributes a better state of health and stamina, and a capability for active pursuits, far superior to that enjoyed by him in England, to a systematic use of these exercises.

In the Governor General's Body Guard there is a very good specimen of a gymnasium amongst the troop-

ers, some of whom are very well developed athletics, among the old and most respectable hands.

The gymnasium of the Asiatics much resembles that of the ancient Greeks, first introduced at Lacedæmon. The Hindoos perform these feats in imitation of Ram, the deity of war and victory. They have the "Palæstra" (Ukhara) for wrestling and other feats of agility, the Conistereum or conistra, in which they cover themselves with sand or dust, and the stadium for spectators. There is likewise the gymnasiarcha, (Khuleefa) who is the director and superintendant of the whole elected by general consent for superiority as having vanquished all the rest; the Zystarcha who presides in the Zystus or stadium. What originated in the early establishment of society for the purposes of acquiring strength and dexterity in repelling an enemy, became converted into a part of medical regimen when luxury and idleness reduced them to the sad necessity of applying to Physicians, who referred them to the practice of gymnastics as a preservative, as well as a means of re-establishing health. Herodicus was the first Physician who adopted the practice, and Hippocrates in his book or regimen treats on the subject. The gymnastic art came ultimately to be divided between them and the master of martial and athletic exercises, as it is again in this age of luxury and civilization between physicians and the teachers of calisthenic exercises. It is likewise the principle on which the most successful practitioners of the present day found their measures for obviating and

curing deformities of the spine and other parts of the body.

The “Moogdurs” the “Dund’h” and the “Lézum,” are the best kind of exercises for general use in India, though it would be well for a young man to go through the whole system at first under a regular “Puh,lwan,” and afterwards continue the Moogdurs, Dundh and Lézum in moderation, as a high degree of artificial training may be carried too far; excess, even in what is good, is to be avoided. Nothing is so conducive to a perfect capillary circulation, to the healthy action of the liver and of all the secretions, the tone of the stomach and the sthenic state of the nervous and muscular system, enabling us to bear up against a long and sultry day. Friction and shampooing should not be omitted.

The Romans carried these athletic exercises to their utmost pitch, accompanied by all the state and magnificence of wealth, but it participated in the general downfall of that empire; and until recently the association of medicine with gymnastics was not renewed in Europe.

Moderate stimulation is requisite to the European in India, water drinkers are not observed to be the healthiest people.

One remark may be offered regarding the cause of that exceedingly common inflammatory disease in India, Hepatitis. The predisposing causes of it need not be repeated. Such a disorder is scarcely known among the natives. The more the general circulation

is excited in the plethoric state, the greater will be the demand on the excrements. *Heat* accelerates the circulation, therefore increases excretion; the greater the natural functions of the organ and its importance in the economy, the more will it partake of the effects of high temperature acting on the general circulation. When we consider the immense quantity of blood circulating in the parenchyma of the liver, its great size, and the importance of this gland in its excreting as well as its assimilating functions, on the absorbed materials conveyed by the mesenteric veins, and its well known vicarious action and sympathy with the skin, how can we be surprised at its predisposition under plethora to this exciting cause of inflammation i. e.—heat followed by a sudden chill? A portion of the materials absorbed from the digestive tube would appear to be removed either by the radicles of the mesenteric veins themselves by means of the vasa brevia branches of the splenic vein emptying itself into the vena portæ, or through the medium of absorbents or lacteals running to these veins and thus establishing a communication, between the mesenteric glands the veins and the absorbents. These materials being circulated with the blood in the vena portæ are more intimately *assimilated*, than they would be by the thoracic duct, preparatory to their more perfect assimilation in the lungs. Thus we see the exploded doctrine of the ancients of the use of the liver somewhat revived—

vide experiments of Tiedemann and Gmelin on absorption, and by MM. Seiler et Ficinus.

Inflammation from sympathy—But to return, many inflammations are induced *sympathetically* arising from diseased actions previously existing, remote from the part affected. Inflammation, and sero-purulent effusion in the pericardium and pleura following phlebitis from venesection, and inflammation and deposition of pus in the lungs, liver and spleen, following serious local injuries (as severe compound fractures and gunshot wounds) are instances of this sympathy. The reciprocal influence of the abdominal organs and head is well known. How quickly will a mental emotion destroy the appetite: how generally is injury of the head followed by sickness: or the presence of worms in the stomach produce symptoms assimilated to hydrocephalus in children. Hypochondriasis and melancholia arise from mental disturbance. Languor and debility from disorder of the biliary secretions &c. these all though not inflammatory phenomena illustrate the influence of nervous sympathy. The high organization and nervous connection of these parts will account for these phenomena.

A carious tooth, or diseased vertebra or joint exciting inflammation in adjoining textures are further instances of this sympathy.

Experiments have been made by Magendie and others on the *controul of the nerves over nutrition*. Inflammation and suppuration of the eye, with sloughing of the cornea,

and inflammation of the lungs, follow division of the 5th and 8th nerves respectively are accompanied by peculiar phenomena. The following explanation of these phenomena has been given* viz. These being nerves of sensation, their section must suspend sensation, and thereby alter or diminish the secretions of the part; and as these secretions serve as a defense from the irritation of foreign matters to which these parts are habitually exposed, they become inflamed from exposure. Magendie, Prevost and Dumas have represented the globules and capillaries of the lungs of almost exactly similar dimensions. It is probable the section of the 8th pair influences the disposition of the capillaries, and their capacities with reference to their globules. We know however that in the case of animals fed on unazotized substances or kept long fasting similar results have been induced. In the human subject, it would seem that similar results follow from a want of *variety* of food accompanied by causes producing debility.

Some deplorable instances of such disease occurred amongst the prisoners in the jails of Mooradabad, Shahjehanpore and Cawnpore under our personal observation, and we believe in various other parts of India. These unhappy creatures were subject in the highest degree to every debilitating cause. Imperfect nourishment, their aliment possessing neither diversity, nor multiplicity of ingredients, impure air, especially confinement at night in closed wards surrounded by high walls,

* Alison.

excessive heat in the summer, sudden cold, and great range of temperature in the winter months, fatigue and mental depression. Many of these were exposed to an endemic dysentery, under which if they did not succumb, they became reduced to the very lowest ebb of debility, torpor and apathy. Almost all the secretions were suspended excepting that of the mucous membrane of the bowels. Their tongues were pallid, their extremities shrunk, and the surface of the whole body cold even in summer. There was no cutaneous transpiration.— Their eyes were glassy. Under this the inflammation of the conjunctiva occurred, an ulcer formed on the cornea, which speedily sloughed and penetrated the whole of the layers, followed by an evacuation of the humors of the eye. It was particularly remarked in *all* the cases, that there was *no pain*. There was increased secretion from the meibomean and lachrymal glands, and suppuration of the conjunctiva. The anterior chamber became filled with a muddy purulent fluid. The ulcer of the cornea sloughed, the lens became evacuated and the eyeball of course collapsed. Both eyes were often affected, and the patient generally expired in an extreme state of emaciation. The above phenomena resemble those exhibited in animals fed by Magendie on sugar, olive oil, and other unazotized substances, and those where the 5th nerve was divided within the cranium.

Chronic inflammation is a consequence, or termination of the acute form of the disease, a sort of habi-

tude of action being established—relaxation, exhaustion and loss of tonic vital contractility of the vessels are its characteristics. Such a condition is well illustrated in chronic ophthalmia, and chronic gonorrhœa, succeeding to the acute forms of these diseases. The part is turgid and swollen. The sensation of pain and heat are diminished, and the blood circulating is darker. An intermediate variety occurs either idiopathically or accompanying febrile diseases and exanthemata &c., which has been termed subacute. As it was purposed merely to treat on the *pathology of inflammation* in general, it is unnecessary to add further on the modification of the same phenomena. Neither is it deemed necessary to lengthen this subject by expatiating on the general *treatment of inflammation* which will be hereafter considered under each particular disorder.

Scrofula as a variety of chronic inflammation demands a few remarks.

The *strumous* diathesis may be characterized, by a highly delicate and beautiful capillary development.

It is described as a disease originating in congenital debility which attends its whole course, and imparts to it a peculiar character, rendering the various processes of inflammation in it slow and imperfect; yet it affects even vigorous constitutions possessing much vascular development, when the *predisposing and exciting causes* concur in sufficient number and intensity; as impure atmosphere, imperfect nutrition, deficient cleanliness, and exposure to damp and cold, and whatever

causes or diseases irritate and debilitate the system. It is the disease of the Zunana, and populous cities of Hindostan in all its forms, especially the lymphatic glandular suppurations and sinuous ulcers of the cellular tissue under the skin of the neck (Kant, hmálá) ulceration of the spongy heads of bones, suppuration of cartilages, and synovial membranes, and strumous ophthalmia.

The proximate causes of Scrofula.—This diathesis modifies the appearance of diseases. It would appear to depend on some peculiarity in the condition of the blood, especially in its disposition to the formation of tubercles in various tissues, and the constitutions favoring their formation are probably an unusual serosity of the blood, and its languid motion in numerous small capillaries. Under these circumstances partial exudations of its albuminous portion are apt to take place, and cohere together in minute spherical masses, which are destitute of the power of acquiring an organized structure themselves, but grow by attracting fresh matter from the vessels; and this exudation although not absolutely dependant on, is much promoted by, congestion of blood, or inflammation in the parts where it takes place.”*

* Alison.

SEC. II.—ULCERATION.

Ulceration may be defined the removal by the action of the absorbents of a portion of the body causing a breach of substance or solution of continuity and accompanied by the formation of matter.

In inflammation the action of the absorbents is overpowered. The balance between the secernents and absorbents is lost—but when ulceration is established, these latter vessels not only resume their office, but their action is increased, and the textures themselves which are undergoing such process exhibit the appearance as though the substance was eaten up by the absorbents. Such a state is preceded and accompanied by an inflammatory action, with deposition of lymph around, which latter prevents the occurrence of hæmorrhage, or the introduction of noxious secretions into the system. In unhealthy conditions of such sores, this adhesive inflammation is not so well marked, and a serous and sanious discharge takes place, attended often with hæmorrhage.

It is a phenomenon no less curious than true, that the body has the power of removing parts of its own substance, as well as forming itself. “ Dans les corps vivans, says Cuvier, chaque partie a sa composition propre et distincte; aucune de leurs molécules ne reste en place; toutes entrent et sortent successivement: la vie est un *tourbillon* continuel, dont la direction, toute

compliquée qu'elle est, demeure constante, ainsi que l'espèce des molécules qui y sont entraînées, mais non les molécules individuelles elles-mêmes; au contraire, la matière actuelle du corps vivant n'y sera bientôt plus, et cependant elle est dépositaire de la force qui contraindra la matière future à marcher dans le même sens qu'elle. Ainsi la forme de ces corps leur est plus essentielle que leur matière, puisque celle-ci change sans cesse, tandis que l'autre se conserve, et que d'ailleurs ce sont les formes qui constituent les différences des espèces, et non les combinaisons de matières, qui sont presque les mêmes dans toutes."—*Rapport Historique sur les Progres des Sciences Naturelles. Paris, 1810.*

An equally curious phenomenon is the tendency to absorption of all intervening textures between the depositions of pus and the surface, whilst on the contrary, there is an actual deposition, thickening, or increase of all textures within, thus forming a barrier between the abscess and internal structures; however dense in the former, or thin in the latter these textures may be.

Ulcers surgically speaking when assuming a reparative action are granulating surfaces secreting matter. These granulations are composed of organized lymph having blood vessels, absorbents and nerves. They are in fact, when viewed by means of the microscope, a complete capillary tissue, and probably a real creation of the lymph itself. According to Sir Everard Home,

coagulated pus, under the microscope, appears to be rendered *tubular* by the extrication of its carbonic acid gas, and these tubes are immediately filled with red blood, and are thus connected with the circulation. Their characters are necessarily therefore modified by the constitution and the degree of vitality of the part, and their conditions are readily recognized by the experienced surgeon both by their external characters and by the state of the constitution, being distinguished into the healthy, the weak, the indolent, the irritable, and the varicose. Such is the ordinary arrangement of ulcers when not partaking of any specific characters, as modified by scrofula, syphilis, carcinoma, or other specific diseases.

I. *Healthy ulcers*, where the curative process is proceeding favorably in a healthy constitution, the granulations are small and pointed and do not rise above the level of the surrounding skin. They are of a florid color, their capillaries containing arterial blood. The purulent secretion is thick, whitish and moderate in quantity.

In the *treatment* of such a perfectly natural process the only indication is to favor the granulations and cicatrization. With such a view a soft poultice, simple dressing, a light bandage, and rest in the recumbent posture. The limb being elevated to facilitate the return of blood, and to prevent engorgement of the vessels are all that is necessary; avoiding all undue excitement of the constitution. When the granulations

are approximating towards a level with the surface the application of dry lint and a pledget of simple ointment with a bandage encircled from the toe to the knee, if the ulcer be on the lower extremity, is the best, and when they have risen to a level with the skin, the lunar caustic should be applied, to form a scab, under which cicatrization is established. All hairs should be shaved from the vicinity of an ulcer, as they are a source of irritation.

It does not appear that the healing of wounds by "second intention" in a healthy state, differs materially in a physiological point of view from union by "first intention," further than in the circumstance of pus being secreted on the surface of the coagulable lymph of the granulations in the one case from exposure to the air, whilst inosculation in the vessels of the opposite plastic surfaces of the lymph takes place in union by "first intention" without the secretion of pus. In proof of this it often happens that at an advanced period the second intention may be converted into the first intention; this is often witnessed when the discharge begins to thicken and diminish in quantity, when the granulations are small, florid and acuminated. At this favorable moment union may be rapidly promoted by dressing the wound as a recent breach of surface, and a plastic union may be thus effected in eight and forty hours.

"So much indeed does the process of granulation depend on exposure to the atmospheric air, that when

internal parts in a healthy individual have been slightly torn and the divided surfaces kept separate, pus is not secreted. In these cases coagulable lymph fills up the deficiencies, consolidates, becomes organized, and undergoes changes which fit the parts for their particular functions. This method of reparation is seen in fractured patella, olecranon and ligaments."—*Wise*.

II. *Weak ulcers*.—In this description of sore the granulations are exuberant, but of a pale color and flabby consistence; the purulent discharge is more serous, and the granulations are readily destroyed by ulceration or sloughing, upon the slightest excitement of the circulation in the part—the surrounding integuments are of a blue tint. The sore is often sinuous, and small unhealthy abscesses are observed in its vicinity. Such ulcers generally occur under derangement of the general health or follow slight injuries. The indications of cure are to destroy these feeble efforts of the constitution by the application of the potassa fusa to the granulations, thus rousing also the energies of the part. This should be followed by poultices for a few days, and stimulating treatment both constitutionally and locally. The unguentum hydrargyri nitratis diluted with simple cerate, or the ung: hydrargyri-oxydi are the best applications.

III. *Indolent ulcers*. These are most frequently met with in the lower limbs, and are generally of long standing. Their margins are thick and sensible, smooth and round. The surface of the granulation is glossy,

hollow, smooth, and pallid, and the discharge scanty and fluid, the exposed surface in short presents the appearance of no new action having been established to fill up the cavity.

Treatment.—Their treatment consists in the employment of poultices, and fomentations till the indurated condition of the edges is removed and the discharge from the surface increased, and to diminish irritability or inflammation should it exist. This is the description of sore to which the system of compression is exclusively applicable. The adhesive plaster best adapted for this purpose is the “isinglass” as far less irritating to the surrounding parts if predisposed to inflammation. In the absence of this three ounces of soap plaster may be mixed with a drachm of pitch;—strips an inch and a half in breadth should encircle the limb, tightly drawn; the extremities of these strips crossing each other. Lint, or tow, may be placed over the above opposite the sore, and the entire limb should be neatly encircled with a roller. Other stimulants besides the adhesive straps may be occasionally useful as the hydrargyrus nitratus ruber, in powder, or the tincture of myrrh. The ceratum resinæ flavæ. The unguentum hydrargyri nitratis rubri, the lotio argenti nitratis gr. ii. ad ʒi., and increased in strength as requisite.

IV. *Irritable ulcers* present the following appearance, the margin of the surrounding skin has an irregular jagged appearance, the edges are sharp and undermined, the bottom of the ulcerated surface exhibiting ir-

regular concavities ; and the part is disposed to slough. There is an over-action, an inflammatory condition, varying with that of the constitution, and requiring a correction of the general health. The discharge is thin and bloody, there is likewise considerable pain. Such a condition requires antiphlogistic and soothing treatment, both local and general, the vapor of poppies, hemlock, &c. Linseed poultices, moistened with a decoction of poppies, and absolute rest, with elevation of the member on an inclined plane or on well adjusted pillows. The surrounding inflamed integuments should be scarified. The solutio argenti nitratis, or the following formula may then be advantageously employed—

Rj. Unguenti cetacei.	} aa ʒ i.;
Unguenti hydrargyri nitratis	

and ultimately exuberant granulations may be suppressed by the sulphate of copper.

V. *Varicose ulcers*.—It is natural to suppose that the congestion of blood in the capillaries from varicose veins should act as a predisposing cause of inflammation and ulceration, and that the varicose state of the venous system should act as a source of irritation and interfere with the action of the capillaries in forming healthy granulations. The sore spreads along the surface, has an indolent appearance, is seldom deep, and has an oval figure, the ends of which are vertically situated. Pain extends along the course of the enlarged veins, which is considerably increased by keeping the limb in the dependent posture. Leeches may be occasionally ap-

plied, and soothing fomentation. Rest in the recumbent position with the limb well raised, together with the administration of the laxatives to evacuate lower the bowels : local applications must be regulated according to the condition of the ulcer, on the principles already laid down. The saphena major can be obliterated, either by the ligature or the application of the potassa fusa, but both practices are occasionally followed by phlebitis, and alarming constitutional disturbance. Neither should it be attempted until the patient has undergone constitutional treatment, a course of alteratives, and vegetable diet for some time. In general the best method of obliterating varicose veins is by passing broad flat needles beneath the trunk and twisting a ligature circularly, or in the direction of the figure 8 under the projecting ends of each needle, so as to compress the vein; taking the precaution to withdraw the pins at the end of about forty-eight hours to obviate the danger of sloughing, ulceration, or phlebitis.

The following is the method by which the vein may be obliterated by the application of the lapis infernalis as recommended by Mr. Mayo.

“ A piece of the potassa fusa, of the size of a split-pea, is put upon the skin over the vein, where it is pretty sound, covered by a small piece of dry lint, and confined with a strip of common adhesive or soap-plaster. In a few hours this application is removed, and water-dressing substituted. The eschar, which has reached the vein, separates after a short time. The

vessel is found to be condensed above and below, the sore heals, and permanent closure, attended with diminution of the varices, is the ultimate consequence. In order to effect this end perfectly, it is occasionally necessary to produce obliteration of the lesser saphena vein also, as it passes towards the popliteal space. The process is not attended with much pain, and there is no great risk of inflammatory action spreading along the coats towards the heart. The inflammation excited is of the adhesive kind, and attended by deposition of fibrine, which is speedily organised, so as to close the canal." Mr. Liston has seen but one case in which the action was diffused; the patient, advanced in life, and of broken constitution, was treated in the Edinburgh Hospital. He perished apparently in consequence of the practice; but it was not a fair case to draw conclusions from, unfavorable to the method.

To prevent any serious result "the patient must be confined strictly to the recumbent position during, and after, the separation of the slough, and until the breach of surface has become well filled up by granulations, and consolidated. By a neglect of this precaution, patients have lost blood to an alarming and dangerous extent. One stout young woman, to whom Mr. Liston applied the potass for the purpose here indicated, chose, contrary to orders, to get out of bed, and remained in the erect position for some time. She was found in a state of syncope in a deluge of blood; she recovered from this, and in order to pre-

vent a recurrence, to induce again the adhesive process, the exposed vein was touched with a small cautery, pressure was applied, the patient kept recumbent and the limb elevated." We have heard of similar instances occurring, and it will be always proper to impress upon the patient the risk of attempting the erect position for a certain period after this method has been employed. Upon the whole, we should be induced to give a preference to the *sutura circumvoluta*, as described above, when from the uncomfortable state of the limb, and the occupation of the patient requiring long persistence in the erect position, it is desirable to relieve the varices from the pressure of a great column of blood; more especially when the limb has become swollen enormously, and ulcerated, and when, perhaps, hæmorrhages have occurred from the ramifications of the veins implicated in the ulcerated surface, in spite of methodical support. In the greater number of cases of varix of the branches of the saphena veins, the removal of the cause, accumulations in the lower bowels, tight ligatures, &c., together with the employment of uniform support, will render the patient comfortable, and do away with the necessity for any operations whatever. "A laced stocking, or a piece of the fine and pliable India-rubber bandage, now manufactured in great perfection, may be worn outside the under clothing; when so applied, it does not slip down, nor does it fret the skin."*

* Liston's operative Surgery, pp. 202 and 203.

The *constitutional treatment* will of course be antiphlogistic, alterative, stimulant, or tonic as may be indicated, in all these varieties.

VI. "*Phagedenic Ulcer*.—By the phagedenic ulcer, is generally understood Gangrena Phagedæna, or hospital gangrene, but there is a phagedenic ulcer not of a sloughing or mortifying disposition, although it eats away to a horrible extent: it is termed by Sir A. Cooper the gangrenous or sloughing ulcer. It occurs commonly after a sore has been neglected or suffered to remain too long open, and not rarely in the syphilitic constitution. It is characterized by irregular knotted edges, smooth and flat on one side, high and rugged on the other; and by its healing in some points, and spreading rapidly in others, but still advancing in extent; the surface also sometimes looks well, at others ill; the discharge either purulent, or thin and ichorous, is sometimes attended with hectic fever; the skin around is purple and "violaceous," and more so where it is phagedenic; the pain is very acute, and at times quite insufferable; the inflammatory action is more frequently chronic than acute, aggravated occasionally by some irritation. This ulcer attacks the integuments of the legs, the labia of the female; the penis, scrotum, groins, and nates of the male, in the town of Calcutta.

"The treatment consists in subduing irritation and inflammation by anodyne fomentations and bread and water poultices, low diet, and rest; next the application of the nitric acid or nitrate of silver every six or eight

days, the bread and water poultices being renewed intermediately. The application of the potass to this ulcer when small is the best, and the decoction of sarsaparilla, with the compound calomel pill, may be given. The diet afterwards should be mild, consisting of vegetables and fruits, poultry, eggs, and milk. The chief object to be observed in this ulceration, is to endeavour to arrest its progress, and change it from the inveterate to the simple ulcer; and nothing is so beneficial in the treatment of this and all inveterate ulcers as change of air. This ulcer may be termed the simple phagedenic. There is a well marked case of it, in the Chatham Hospital Transactions, Vol. I., communicated by the late Dr. Schetkly. The patient recovered by change of air.

VII. "*Noli me tangere*.—There is an ulcer so closely resembling the phagedenic sore, that it ought to be considered of the same kind, but with this peculiarity, that it only attacks the face; from its supposed contagious nature it is named *Noli me tangere*, and is classed by authors under the herpetic ulcer. It generally begins at the alæ of the nose, but not unfrequently in the upper or even the lower lip, also in the forehead or angle of the eye; hence no part of the face is exempt; it spreads upwards, downwards, and centrad, until it disfigures the whole countenance, producing hectic fever and repeated hemorrhagies, till death closes the scene. Its characters are identically the same as the phagedenic ulcer last described, and need not therefore be repeated.

When the ulceration is preceded by a yellow pustular or scabby eruption, surrounded by a violet-coloured circumscribed inflammation, it is named *Lupus*. The moist yellow spots either falling off, or being picked off, expose this ulceration, discharging a thin serous acrid matter. When the inflammation is moderate, there is commonly little pain, but when severe, there is an acute burning pain, with more or less fever. It is a most inveterate ulceration, and, unless treated in the earlier stages, often defies the surgeon.

The treatment should be the same as that of the simple phagedenic ulcer; but if the ulceration continues inveterate, the whole base should be exercised if practicable, and if not, destroyed with the potassa or the nitrate of copper. Probably our best practice, in all cases where the ulceration is limited, is to perform excision very early. Many authors consider this disease constitutional, and recommend internally, arsenic, antimonials, mercury, purgatives, and sudorifics, with vegetable diet and warm baths. There does not appear, however, the least ground for this opinion, since it begins locally, and continues so nearly to the conclusion of the horrid scene. What seems to have deceived us on this subject is, that all ulcers heal from the powers of the constitution; consequently, when these are too vigorous or too languid, the healing process does not proceed. The constitution, as well as the ulcer, requires to be sound.”*

* *Lizars's practical surgery*, Part I. pp. 56—58.

VIII. *Ozæna*.—Is a variety of the same disease exceedingly common in the natives of India. Its ravages are such as to extend to the destruction of the septum, the inferior turbinated bones, the cartilaginous alæ and the dorsum of the nose, of the superior turbinated bones and the floor of the nares and hard palate. The parts sometimes heal by the subsidence of the disease after these extensive ravages. We had occasion sometimes since to perform the Rhinoplastic operation in a case of this description where the parts had quite healed. We far more frequently however witness the affection advancing in its destructive course, and is termed by the natives “*peenus kee beemarie*” death frequently terminates the suffering of the patient from pure exhaustion.

“ The treatment is by a mercurial purge, aperients, as Gregory’s mixture, or rhubarb and the super-carbonate of soda alteratives, as the compound decoction of sarsaparilla, and the solutio arsenicalis Fowleri, light nutritive diet, and by change of air. For the local applications—warm water, or the steam of hot water, bread and water poultices, a solution of the nitrate of silver, or the pure nitrate, and seton in the nape of the neck. The chief object is to alter the idiosyncrasy. A pint of the compound decoction of sarsaparilla, divided into three portions, should be given daily for ten days or a fortnight, and then alternated with the Fowler’s solution, during all which time, a little of Gregory’s mixture, or the rhubarb and soda, should be given morning and evening. The seton ought to be

inserted at once. During any inflammatory condition, syringing with warm water, together with bread and water poultice, should be had recourse to; and afterwards the diseased surface should be touched with a solution of the nitrate, through the medium of a camel's-hair brush, or the pure nitrate, followed by the poultice, which should be carefully removed every three hours, and a fresh one applied, washing all away once in the twenty-four hours, but using the nitrate only every sixth day. Change of air is as indispensable in this as in any other phagedenic ulcer."*

IX. *Malignant Ulcer of the Nails*.—The present classification of the varieties of ulcers would not be complete had we omitted a very common form of malignant disease affecting the matrix of the nails (*onychchia maligna*, *Wardrop*,) in natives and even Europeans in this country, and there are few more painful and distressing. An able account of it, by Dr. Wise, has appeared recently in the Transactions of the Medical and Physical Society. It has appeared to us to be often modified by a syphilitic or pseudo-syphilitic taint of constitution in the natives. "It attacks both the fingers and toes: Even in the incipient stage, it sometimes produces so much distress as to prevent the person walking, and in an after stage it not only produces great pain, but often completely disables the individual from exertion of any kind.

* *Lizars's Practical Surgery*, Part II. pp. 94 and 95.

“The disease usually appears with an inflammation and swelling round the side, which extends round the root of the nails of the great toe or thumb, and sometimes round the nails of the other fingers and toes, Plate I. Fig. 1 and 2. This is succeeded by an ulceration round the inner part of the inflamed part, to which the nail adheres ; with a secretion of a thick fœtid yellowish matter, often mixed with blood. The nail thickens, and changes its colour to a dark brownish horny appearance, and becomes partially detached from its root ; and at last falls off, leaving a red, unequal, sensible surface with an inflamed irritable border, which bleeds on the movement of the member. Horny laminæ, Plate I. Fig. 3, sometimes replace the fallen nail, the inflamed part round them is very sensible, and is accompanied with a painful burning pain ; which occurs at intervals, and shoots along the foot. This stage is often accompanied with a febrile state, which increases towards night, and with the pain often prevents sleep.

“In the first stage, the treatment of this disease consists in a free application of a lunar caustic in substance to the inflamed part, which deadens its sensibility, and changes the morbid action to one of a healing nature. One or more applications are sometimes sufficient to complete the cure. There are cases, however, in which there is much inflammation and swelling, with very sensible granulations, which with the lunar caustic require fomentations, rest and a horizontal position.

“In another variety, when the disease has advanced

further, and produced its constitutional effect, mercurials and attention to the general bodily health is required, with the employment of the honey of borax which has the most salutary effect upon the disease. In such an inveterate case, after other means had been employed for many months without success, Dr. Wisc was induced to try this remedy, from its success in aphthous affections of the mucous membrane of the mouth, which resembles so much the soft, pulpy, and vascular matrix of the nails, both in its structure and uses" and he adduces other cases of the efficacy of borax.

The *onychia accidentia* occurs generally from injuries of the angular corner of the nails growing into the swollen and sensible flesh of the toe "from the great hardness, the irregularity, and the too great development of the nail; or from wearing a narrow, pointed, and thin solid shoe, which presses the soft parts over the cutting edges of the nail, and produces inflammation and ulceration, which, if neglected, often throws out granulations, which are very sensible, and produce much pain and distress.

"The cure of this complaint consists in removing the irritating cause. The angular portion of the nail, growing into the flesh, is to be cut off; or rather if it can be done, it is to be raised with a stilet above the sensible part, and kept so by a tent placed under it, so as to allow the nail to grow outwards, while the inflammation is to be diminished by the application of leeches, lunar caustic, fomentations, &c. In other, more severe

cases, I have found it necessary to divide and remove a portion of the side of the nail, and then apply caustic to destroy the vegetations."* Our own plan is to slit up the nail suddenly with a sharp scalpel. The pain is momentary and the source of irritation is at once removed.

SECTION III.—MORTIFICATION.

The predisposing and exciting causes of this disease, the condition of the solids and fluids, and the natural process of reparation, have already been alluded to. We proceed to review its several *varieties* somewhat further in detail.

Mortification may be divided into the *acute* or *humid*, and the *chronic* or *dry*. The former occurring suddenly either from injury, or inflammation however induced, by external causes. The fluids in consequence remain in the parts. They are swollen and soft and the pain is at first severe. But the latter is a slower process, the fluids having had time to evaporate, hence its dryness. The slowest description of mortification, is that attending the leprosy so common in Asia, the "Joozam" or "Elephantiasis Græcorum," and next to that the gangrene of old people from ossification of the arteries.

The *acute* or *humid* is an affect of all external causes, or severe injuries; the latter cause giving it the designation of *traumatic* gangrene and this whether the

* Wisc.

textures have been lacerated or severely contused or the main artery leading to the part injured.

The *chronic* is an idiopathic disease ; the most trivial exciting causes being adequate to induce it. In the idiopathic there is often found disease of the arteries, their internal textures being altered by a deposition of ossific matter, or from certain disorders of the heart contracting the aortic orifice. There is in other instances an extreme tenuity, discomposition, and diminished vitality of the blood, as in spleen, typhus fever, scurvy &c. and in this sense therefore a vitiated state of the fluids.

Certain internal causes would appear to induce the disease, by acting as a poison altering the state of the blood, as the “ergot of rye.”

Mortification would appear in some instances to assume an infectious character as in hospital gangrene, and in other cases to depend on a specific cause, acting on a specific state of constitution, as in sloughing phagedæna following syphilis and other diseases.

Mortification is divided into *gangrene* and *sphacelus*. The definition of the former is that state which precedes the death of the part, in which there is a diminution but not entire destruction of the powers of life ; the blood still permeating the large vessels, and some degree of sensibility remaining in the part, which is still capable of recovery. The latter, *sphacelus*, is a complete death of the part, they are in fact but two stages of the same disorder.

Parts, the vitality of which are feeble, either owing to remoteness from the heart, and nervous centre, or from the nature of the tissue, as the cellular, are more liable to mortify ; whilst, on the contrary, those possessing a high degree of vitality resist it ; the arteries, for instance, which are observed to oppose the inroads of mortification whilst every surrounding texture has sphacelated.

Excited action itself is seldom adequate to produce mortification, without the existence of the predisposition be induced by any of the causes already referred to, weakening the vital powers of the part or the constitution. It is often for example induced *indirectly* from intense cold, so enfeebling the powers of the part, as to render it incapable of supporting the subsequent reaction, particularly where the stimulus of heat has been imprudently applied with too much intensity or haste.

I. The *acute* symptoms of gangrene are as follows. If of a traumatic character, the part is often immediately deprived of its vitality, or there may be reaction and high inflammation. When proceeding from active inflammation there is severe pain, redness and swelling to a considerable extent around. The surface of the skin is of a dark color. Vesications occur under it, containing a bloody serum. The integuments become insensible, large portions of them give away. The vesications extend, and the part becomes softened.

The *constitutional* symptoms are a quick, small, thready and often intermittent pulse. The nervous

irritation is very great, the patient becoming delirious. The stomach often sympathizes, evinced by nausea, sickness, and hiccough, a spasmodic action of the diaphragm, arising from sympathy with the stomach. There is coldness and clamminess of the surface, and a cadaverous expression of the countenance.

The process of *separation* is one of the most interesting phenomena of Nature. She establishes a barrier between the dead and the living parts. We observe a white line; at this point, the cuticle is raised; the process of ulceration is established in the living textures, extending through the skin, cellular tissue, muscles, tendons and nerves. The adhesion of the larger blood-vessels is peculiar. The adhesive inflammation which is set up at the line of separation extends to the arteries, sealing up the cavities, and coagulation takes place, at a considerable distance along the vessels towards the heart. The coagulum may be also partly accounted for as follows: viz. before the line of separation takes place, owing to the general stagnation, the arteries are unable to transmit their contents. The same phenomenon is observed in the veins. The separation of bones is a slower process, owing to their being loaded with phosphate of lime and possessing slighter vitality.

II. The *chronic* form of mortification may be well illustrated by the example of that of the toes in old persons, in whom the action of the heart is feeble and the arteries ossified. The symptoms are as follows. A slight blush is at first observed accompanied by

pain, but the symptoms are not urgent. In a few days the cuticle becomes detached and a sanious discharge proceeds from the sore. Red streaks marking the course of inflamed absorbents are observed passing from the foot towards the leg. The glands of the groin are inflamed. Gangrene now assails the whole extremity, often as far as the upper part of the leg. The slightest exciting cause is sufficient to produce the disease, as the cutting of a corn or the paring of the nails. The gangrene of the extremities occurring in hydrothorax, or in typhus, enlargement of the spleen in this country, and other Adynamic diseases, are alike induced by slight exciting causes, having all a similar predisposition, viz: low vitality either of the part or of the constitution.

The general principles of *treatment* may be comprized under the following indication.

1st. To remove the causes where practicable.

2nd. To stop the progress of the disease.

3rd. To promote the separation of the mortified from the living parts.

4th. To heal the ulcer resulting from the loss of substance.

1. The first object therefore will be to extract any foreign bodies, to remove all irritating circumstances where they may exist, and to direct our attention to the morbid predisposition of the system where that is at fault.

Where the vitality of a part has been weakened by

the application of intense cold, the temperature is to be *gradually* restored by friction with the camphorated spirits of wine, or if completely frozen by rubbing the part with snow.

2. In the acute form there is often an over-action, indicating the necessity of scarifications, leeches, and other antiphlogistic measures, cautiously and judiciously employed, combined with mild aperients, and avoidance of stimulants; regulated by due consideration of the shock, which the constitution is about to sustain, and the great demand on its resources for the reparation. It is therefore with the greatest circumspection that our antiphlogistic measures should be employed, and that even with the young and robust.

Cleanliness and ventilation are in all cases indispensable auxiliaries in the treatment.

It is an undeniable principle that in gunshot wounds and in all cases of traumatic gangrene where the constitution is *sound*, that amputation should be performed immediately after the first few hours have been allowed to elapse from the occurrence of the accident, and the system rallied from the *depressing* effects of the first *shock*, and the latest period within which the operation can be accomplished with any prospect of success is within 36 hours from the accident. Such practice is equally applicable in cases of gangrene from wounded blood-vessels. In all these cases delay is fatal, and the surgeon must not wait for a line of separation

as the constitution would inevitably sink under the effects of the injury.

Very different however is the practice in spontaneous and idiopathic mortifications. Here it will be absolutely necessary to wait until the line of separation has taken place; such a natural cessation to the progress of the disease indicating a favorable change in the constitution, enabling it to undergo the natural process requisite for its cure.

3. The best local applications for promoting the separation of the parts, where the actions are violent, are fomentations and poultices of charcoal and linseed, carrots or the effervescing poultice.

The nitric acid lotion 50 drops to the quart.

The chlorurets of soda and lime. Both as disinfected agents, and to remove fœtor. It is not improbable they may have the power of checking the progress of disease in the living parts whose circulation and vital powers are declining.

The Balsam of Peru, the yellow or black basilicon, and the powdered camphor are also eligible stimulants.

When the vital process of separation is advancing, the following applications may be employed.

Camphorated fomentations, and the various terebinthinate applications.

The chief stress however is to be placed on the *constitutional* treatment; with this view, quinine with opium, and the carbonate of ammonia with laudanum,

or musk and opium with nourishing food and wine, or the accustomed stimulus of the individual.

The slough should be removed 'as soon as possible by the assistance of the surgeon.

4. The ulcer will of course be treated on the general principles applicable to such sores.

• III. *Hospital gangrene*, or *phagedæna gangrenosa*. Wherever the combination of crowded hospitals and impure atmosphere together with high temperature and moisture exist, aggravated by inattention to cleanliness, this form of disease is apt to invade ordinary ulcers and abraded surfaces. It is often aggravated by direct application of morbid matter from dressings, yet it would appear to originate in the first instance in an infectious state of the atmosphere.

Symptoms.—One or more small vesicles containing serum or a bloody fluid are observed, and generally at the edge of the sore. There is a stinging sensation, and the wound exhibits an unhealthy aspect, the slough extends, and becomes phagedenic. The sore is of a circular form, and the integuments are attacked with erysipelas, often to a great extent; the lymphatic glands in the vicinity inflame and suppurate and the textures become converted into a putrid pulpy mass, aponeuroses, muscles, tendons, and even the bones partaking of its ravages. The blood-vessels, which in other mortifications resist the inroads of the disease, do not here escape. There is no tendency to form coagula in their calibre, and there appears to be a total incapacity of nature to produce a

healthy adhesive inflammation, hence the too frequent occurrence of alarming hæmorrhage.

The constitutional symptoms are a full and sharp pulse. There are rigors succeeded by heat, but no perspiration. The tongue is covered with a thick white mucus, and there is anorexia. The pain becomes excessively severe and burning, and the most alarming symptoms of collapse often terminate the scene.

The symptoms in other cases are of a typhoid character, the pulse being small and frequent, with all the other attendant characteristics.

Prophylactic measures.—The first object is to prevent the spread of disease. The utmost attention should be paid of course to cleanliness and ventilation. All filth and stagnant water should be removed, and due attention be directed to the drainage. Lime and chloride of lime if possible should be sprinkled throughout the drains when they have been well cleansed. The uninfected should be separated from the infected and the former should be placed on an *antiscorbutic* diet. Acidulated drinks and wine should be given, and every attention paid to their general health, and to the dressings of all sores.

The nitric and oxygenated muriatic fumigations should be used in the wards, as disinfecting agents.

Where there is high inflammatory action and fever, the constitutional *treatment* should consist in venesection and the administration of purgatives followed up by laxatives. The local applications should consist of

a weak solution of nitric acid. Repeated ablution of the sore should be effected by a steam of tepid water and the glutinous matter be carefully detached. Calomel in large and repeated doses so as to induce ptyalism has been found to put a stop to the disease.

Anodynes and sudorifics ought to be administered especially at night.

The disease however is very apt to assume the typhoid character. The constitutional treatment should consist of bark, sulphate of quinine, opium, camphor and ammonia. Equal parts of Fowler's solution of arsenic and water should be applied on lint to the sore so as to produce a slough, and the surface should then be treated by hot dressings of turpentine and bark or turpentine and resin, or a healthy surface may be produced by the nitric or sulphuric acid diluted, the nitrate of silver, the red oxide of mercury, or the actual cautery.

IV. *Anthrax or carbuncle* is a variety of mortification situated in the cellular membrane. The subcutaneous cellular tissue sends numerous small processes accompanying the bloodvessels and nerves which belong to the skin, ramifying in the cellular tissue under it, advancing their branches into the skin itself. The skin on minute dissection exhibits numerous small holes which are the parts through which prolongations of adipose substance accompanied by the bloodvessels and nerves proceed. Carbuncle consists in inflammation of several of these small processes of cellular tissue.

Carbuncle occurs most frequently in the back, the

nates &c. and occasionally the head and neck where it is particularly dangerous.

The *predisposition* is often an unhealthy habit of body induced generally by repletion from excess in eating and drinking, deficient exercise &c. It is characterized by violent burning pain, extensive swelling and induration, the integuments being of a shining red appearance, they then become of a livid hue, and the tumefaction spongy and soft to the touch, numerous ulcerated orifices now occur in the skin, which give exit to thin unhealthy matter, excoriating the neighbouring parts. The progress of suppuration is slow from the smallness of the apertures, and the mortified cellular tissue keeps up the irritation.

The constitutional symptoms are typhoid often in the most alarming degree. There is great depression of the nervous system and the prognosis, consequently, in old persons, and where the head and neck is the seat of disease, is most unfavorable, the disease terminating frequently in fatal effusion beneath the tunica arachnoides and pia mater.

The sloughs must be early evacuated by a deep crucial incision. Emetics, and purgatives combined with calomel are often advantageous, succeeded by alteratives. Anodynes are also occasionally indicated; and bitters. When the constitution is enfeebled, it will be necessary to administer bark, ammonia, camphor, acids, beer and wine.

V. The *furunculus*, or *boil*, is a milder form of the

same disease, inasmuch as it occupies but one of the small processes of the subcutaneous cellular substance. It is an extremely common affection in Hindostan. A crucial incision to evacuate the slough, with attention to the digestive organs by alteratives and saline purgatives, and the avoidance of *stimulating* articles of food, seem all that is requisite.

VI. *Malignant pustule*.—This is another form of gangrene communicated, by the application of the fluids of animals which have died of putrid diseases to an abraded surface. It is even said to arise from the handling of dried hides, and that without any abrasion of the surface existing previously. It occurs in veterinary practice, and likewise amongst those who have occasion to handle carrion. It commences by the appearance of a vesicle, which contains a bloody serum. A hard moveable substance and circumscribed tubercle forms, without alteration of the surrounding skin. The bottom of the sore is yellow, greenish, or livid, and the sensation is that of acute heat and erosion. Phlyctenæ spread around, the tubercle becomes black in the centre, and an eschar forms. The patient becomes irritable and languid, and gangrene extends, accompanied with a series of alarming symptoms, both constitutional and local equally as fatal as those of the most malignant form of carbuncle or Hospital gangrene. The most successful *treatment* is a powerful escharotic of the potassa fusa or actual cautery, applied to the exposed surface. The treatment is in other res-

pects regulated by the principles applicable to the other forms of mortification.

SEC. IV.—ERYSIPELAS.

Erysipelas in its ordinary form is an inflammation characterized by pain of a peculiar kind, very slight swelling, heat and redness, bounded by a defined margin extending over the cutaneous surface, its seat being limited to the *cutis vera*. A general blush of vascular excitement and distention of its vessels, without any of that deposition which constitutes the hard and firm swelling of phlegmonous inflammation.

Symptoms.—The pain is accompanied with a sensation of burning and stinging.

The *swelling* is soft and *diffused* extending over a considerable surface of the body. There is indeed generally but a slight elevation, and that only at the subsidence of the inflammation when the vessels have relieved themselves by effusion. In milder cases, there is no such effusion.

The *bright scarlet* color is accounted for by the contiguity to the surface of the numerous superficial vessels ramifying on the skin. The redness disappears when pressed by the finger, leaving a white spot for a short time. There is frequently a yellowish tinge in the color of erysipelas, and often a brick red color.

Erysipelatous inflammation takes place very suddenly, and often as suddenly disappears.

Progress and stages.—As the inflammation advances the cuticle becomes elevated into vesicles of various sizes produced by the effusion of serum from the vessels of the cutis. The fluid in these is at first transparent but becomes shortly afterwards yellowish, and ultimately purulent, which on the rupture of these vesicles is incrustated into a scab. The surrounding portions of the skin undergo the same process of inflammation, effusion, vesication, and incrustation; and, on the natural separation of these incrustations, the skin will be found to have assumed its healthy appearance, presenting an interesting physiological fact of the rapidity with which the cuticle is secreted over an extended surface. Such process of *resolution* is the *ordinary* termination of the affection, but it may end in desquamation of the cuticle without any visible vesication, or in cases of the aged and debilitated in mortification, or when affecting the head, in inflammation of the membranes of the brain and effusion on its surface, owing to the close vascular connection existing between the scalp, pericranium and dura mater.

Diagnosis.—The peculiarity of this disease is to extend itself indefinitely over a considerable portion or even in some instances the whole of the body; a circumstance accounted for from *continuity* of the same texture, as is the case in pleurisy and peritonitis, thus remarkably distinguishing the disorder from that of *phlegmon*, the extension of which is limited by effusion of *lymph* in the cellular tissue in which the latter af-

fection is situated. The pain is also not of the darting throbbing character of the latter, and the other diagnostic symptoms are sufficiently evident. Another peculiarity is the invariable *desquamation* of the cuticle, excepting in cases of metastasis above alluded to.

It is scarcely necessary to add that the presence of tumefaction with vesication, distinguishes the disease from erythema, which latter is a simple efflorescence without swelling, vesication, or constitutional excitement.

The *constitutional* symptoms, though occasionally slight, are often exceedingly severe, varying necessarily with the habit and state of health, the age of the individual, and seat of the local affection.

I. In that form of the disorder which has been designated *bilious erysipelas*, there is great derangement of the chylopoietic viscera, and especially of the secretions of the liver, hence its distinguishing designation. There is foulness of the tongue, which is covered with a yellowish mucus, and though the vascular excitement may be considerable at first, yet the symptoms after a time are apt to assume a typhoid character, with a dry brown tongue and general adynamic symptoms, with tendency to wandering delirium and coma.

II. In the *phlegmonous* or acute form, the skin is more elevated, and the redness of a darker hue; the fever with which it is ushered in, being of an inflammatory character.

The phlegmonous form is apt to attack the head. On such occasions it is generally introduced by shivering,

followed by pyrexia for some time previous to the development of the local symptoms. The forehead, the cheeks, the nose and the eyelids become affected, and the disease extends successively over the whole head. This has been styled from its resemblance to the exanthematous order of cutaneous diseases, *erysipelas exanthematicum*. The face assumes a very unsightly appearance and the disease is apt to become exceedingly dangerous from the supervention of delirium and coma.

The varieties of the disorder have been designated as follows: *erysipelas ambulans* or *erraticum* from its erratic character, *erysipelas œdematodes*, the seat of which is in the face, being of a paler color, with great œdematous tumefaction from serous effusion and occurring in dropsical or debilitated individuals, and perhaps nothing more than anasæra, and *erysipelas gangrenosum* occurring in the face, neck, and shoulders, with symptoms of low fever and great tendency to slough. But as these are all varieties of the same essential disorder, to which the same general principles of classification, as well as of treatment, are applicable, it is unnecessary to expatiate upon them. But the most important variety demanding a separate consideration is that termed

III. *Diffused inflammation of the cellular tissue*. It may be stated generally that erysipelas does not ordinarily extend beyond the cutis vera, although in the phlegmonous form it does. Should *purulent effusion* occur, it is diffused in such cases, and not limited as in true

phlegmonous abscess, and the matter is of a thin unhealthy appearance mixed with sloughs of the cellular substance. *The diffused cellular inflammation* is undoubtedly only a high degree of *phlegmonous erysipelas*, presenting the same *specific* and appropriate characters. There is effusion of bloody serum, under the cuticle followed by discharge of pus from the subcutaneous cellular tissue to an unlimited extent, instead of being bounded by the deposition of lymph. Its ravages extend often beyond the subcutaneous to the cellular tissue among the muscles, to a considerable depth below the skin. It likewise occasionally occurs independently of any affection of the skin.

Symptoms.—The pain attending this affection is of a burning throbbing kind from the commencement, and increases considerably as the disorder advances.

The *swelling* is firm and resisting, instead of being soft and pitting, as in the ordinary form of erysipelatous inflammation.

The redness is generally of a bright color, tense, and shining, or it may be of a deeper and even livid hue. These appearances rapidly spread over the whole extent of the limb. Serous effusion, suppuration and sloughing extend to a degree corresponding with the external symptoms. A sero-purulent fluid is disseminated throughout the cells of the texture, and thick well formed matter is often discovered in separate spots.

The external swelling now loses its tense and firm character, and becomes soft to the touch, without any

distinct fluctuation. The skin ultimately yields at certain points, but the sloughs of cellular membrane are but imperfectly evacuated. The ulceration however proceeds and the collections of matter become more freely evacuated, with extensive shreds of cellular membrane soaked in pus.

As the sloughing process is advancing, the supply of vessels to the skin being cut off, this also loses its vitality and sloughs to an extensive degree.

The *constitutional* symptoms at first are those of excitement. The disturbance of the digestive organs is often very great, but ere long, as the disease proceeds, the pulse becomes rapid and weak, the functions of the sensorium are disturbed, the tongue is dry and brown, the stomach and digestive organs are more disordered, and in short typhoid symptoms of the severest kind are now established.

Such is the alarming state of disease arising from many *causes*, but especially from the introduction of a poison into the system. It is often produced from wounds inflicted in dissection; sometimes from venesection and other local injuries, especially in those unhealthy states of the constitution already alluded to.

It sometimes prevails almost epidemically with erysipelas. There can indeed be little hesitation in attributing this and certain other forms of *internal* inflammation affecting the mucous membrane of the air passages, occurring simultaneously with that of the head and neck to similar causes; also that form of peritonitis termed puerperal fever, likewise prevailing epi-

demically at the same period as erysipelas, and the frequent extension of external erysipelas to the fibrous textures of the pericranium. As like effects are produced by like causes, all these various forms of disease, often spread by means of some atmospherical agency not at present understood. They are attended by similar typhoid symptoms, and the same local phenomena of extensive effusion of thin bloody serum and pus, unlimited by deposition of lymph.

The *predisposing causes* of erysipelas generally, are, derangement of the system, arising from disorder of the digestive organs, and suppressed secretions in unhealthy habits. Intemperate individuals in a morbid state of plethora are liable to the affection.

The *exciting causes* operate often directly, as injuries, wounds, surgical operations, &c. Irritating dressings to wounds have a similar tendency to excite erysipelas, as well as various vegetable, mineral and animal poisons. Exciting passions, as anger, or sometimes acute grief, are liable to produce the disease in the predisposed, and especially to bring on relapses to which there is great tendency in those who have once suffered. Intense heat or exposure to cold when the body is heated, the latter cause acting indirectly, also act as exciting causes.

Erysipelas is apt to prevail in contaminated states of the atmosphere, as in that form that affects infants in lying in hospitals, commencing at the umbilicus, extending to the pudenda, and terminating fatally in gangrene. This circumstance, associated with the fact of hospital

gangrene occurring under precisely similar circumstances, being attended with the erysipelatous character, and other instances of erysipelas attacking abraded surfaces and spreading amongst the wounded, has fully authorized the doctrine of their contagious nature. There can be little question that erysipelas and hospital gangrene are often but degrees of the same affection, or, at all events that there is a close alliance, both from the similarity of the *causes* and *circumstances* under which they originate, especially an impure state of the air in crowded and ill-ventilated hospitals.

The *treatment* will of course vary with the state of the constitution, and extent of the local affection. In ordinary cases it will consist in the administration of moderate purgatives, a light vegetable diet, rest, and a cool atmosphere. Emetics are beneficial as well as mercurial purgatives, followed by saline aperients, where there is much disorder of the visceræ secretions.

In *phlegmonous erysipelas* the antiphlogistic treatment will necessarily be more decided. Venesection will frequently be requisite at the commencement, especially in young and robust subjects, followed up by active aperients combined with calomel, saline medicines and antimonials.

In these peculiar inflammatory states of the constitution we cannot be too particular in reducing the system previous to the performance of any serious operation.

In many instances the system must be early supported by tonics. Wine and other stimulants, with nourishing diet. The carbonate of ammonia, in doses of

from five to ten grains is an invaluable remedy as well as the sulphate of quinine. Wine however should be exhibited with caution, and discontinued when the symptoms of debility disappear.

The best *local* treatment, when the inflammation is at its height consists in free scarifications, followed by fomentation with bags of chamomile flowers, which is highly soothing to the patient, relaxing the skin, favoring diaphoresis and alleviating pain.

In the severer forms of *phlegmonous erysipelas*, and especially in the *diffuse cellular inflammation* and infiltration, extensive *incisions* will be indispensable, especially where the extremities, or the scalp are the seat of disease. Such decisive treatment is the only method of averting or arresting the alarming typhoid symptoms which occur in diffuse cellular inflammation, where the sloughs are not speedily evacuated. Even where the pulse is exceedingly low, the patient is often able to endure the loss of a considerable quantity of blood taken locally in this manner from the vessels of the part, when it would be unsafe to abstract the smallest quantity from the system generally. This should be followed by the exhibition of large doses of Dover's powder, and when the parts have been well fomented, they should be enveloped in a soft poultice, but containing no unctuous ingredients.

Cold applications are dangerous in erysipelas, as calculated to produce metastasis, and in case such an event should occur to an internal organ blisters should be applied to the part originally affected.

CHAPTER II.

ON

PARASITIC GROWTHS.

SEC. I.—TUMORS ESSENTIALLY BENIGN, THOUGH OCCASIONALLY DEGENERATING.

Various textures of the body are liable to become the seat of *parasitic* productions more or less assimilating themselves to those structures in which they appear to be situated. They ordinarily occupy the cellular tissue, and must be considered as morbid productions constituting no part of the original composition of the body.

For the convenience of classification it will be necessary to consider, first, those formations which occupy the cellular substance, the more numerous and unmalignant kinds of tumor, whether of the *sarcomatous* or *encysted* description; next, to treat of the simple productions which occur in the substance of the glands, and lastly, of such proceeding from perverted states of nutrition, whether in the glands themselves, or other textures of a *malignant* nature.

The first class of tumors are usually incapable of removal, except by surgical operation, and too frequently the second. The latter are also susceptible of being discussed in certain instances by remedies acting on the absorbent system; and the last *only* by early surgical interference.

Origin.—They may undoubtedly originate in the effusion of lymph, and in such instances, are traced to inflammation. They are occasionally congenital. A remarkable instance of such was witnessed by myself at Delhi, in an adult native. His body was covered with I had almost said, *countless* adipose tumors, varying from the size of a pumpkin to that of a pea. I removed one of them from the spinous processes of the dorsal vertebræ weighing about 3 lbs. Where they originate in inflammation they often differ in their textures from the parts in which they form.

Tumors are less liable to absorption than the simple inflammatory productions. They increase after all inflammation has ceased. In other words, nutrition predominates over absorption. They may also originate in coagula of effused blood. In either case, the lymph or coagulum becomes organized, assuming various forms of structure, according to circumstances which are beyond our comprehension. Lastly, tumors originate sometimes in chronic inflammation, and are often aggravated by fresh attacks of that process, but in numerous instances no such origin can be detected.

The vessels ramifying, on such growths, consist of

minute arteries whereas in the false membrane from inflammation many of them are veins.*

There is a distinction between those deposits which are new to the system, existing no where in the healthy state, and those which are only found in new situations; but many tumors contain matter of both kinds, being fatty or bony in some parts, and tubercular and scirrhous in others.†

The part may be supplied with bloodvessels and nerves by a narrow pedicle, or it may be furnished by ramifications, at various points, on an extended surface.

In a simple tumor, the part, though supplied with vessels from the contiguous parts, lives and grows by its independent powers; whereas in malignant growths they depend on morbid actions of the parts around, hence the removal of the latter by operation is seldom followed by a permanent cure.

The *process* of nutrition is greater in the tumor than in the surrounding parts, it therefore increases, and as the enlargement advances, the surrounding cellular texture yields, and becomes condensed, forming an envelope to the tumor, as it advances towards the surface of the body to which it has a natural tendency.

The degree of density or looseness in the attachment of tumors to the surrounding parts, depends on the extent of inflammation excited in the circumjacent textures; we therefore find, when symptoms of inflam-

* Schræder vander Kolk.

† Alison.

mation have been manifested in the history of the case, that they have established an intimate connection with these neighbouring textures. Such irritating causes likewise expedite their growth, as, on the other hand, their increase is retarded by all such means as tend to diminish the *vis a tergo* in the arteries leading to the part itself. Some tumors increase with great rapidity, whilst others become stationary for years, and afford little or no inconvenience.

Tumors may also be divided into *local* and *constitutional*, the former being unconnected with morbid action, the latter pervading various parts of the system, and being of a *specific and malignant* character.

I. *Sarcomatous tumors*, are of the first description; and probably most tumors in the first instance consist of this structure, but the peculiarities which they afterwards exhibit depend upon some subsequent diseased actions, which have not been clearly ascertained. The most simple form of local tumor is that produced by the infiltration of lymph, the *ordinary vascular sarcoma*. The lymph becomes organized by the penetration of vessels into it. One of the best illustrations of this description of the tumor, which is apt to increase to a considerable extent, is that which is extremely common in Bengal, and which I have designated *hyphertrophy* of the *scrotum and cellular tissue*, which will serve as a fair illustration of a disputed pathological question, viz. the inflammatory origin of this class of tumors. It is also very common in the lower extremities.

Symptoms.—This affection has frequently been traced by Mr. Egerton, and other eminent surgeons in Calcutta, to *inflammatory action*. Dr. Wise in a most able paper on the subject considers the affection essentially to be an inflammation of the veins (phlebitis.) The patient feels pain and heat in the part, and it is often ushered in by a smart paroxysm of fever, followed by effusion of lymph in the scrotum, which becomes tumefied, and continues so after the subsidence of the other symptoms. The fever frequently returns with inflammation and increased swelling. It may be successfully combated in the early stages by a persevering use of purgatives, issues, alteratives, local frictions, and a careful avoidance of the influence of the weather particularly when combined with the local application of cold and moisture; but the natives can seldom be induced to persevere, and generally neglect the early stages of the disease.* The prepuce is sometimes simultaneously affected. The tumor now increases, but without pain, and not rapidly until it has attained a certain size. It gradually advances, and at length conceals the organs of generation. Its progress is now more rapid from the unresisting structure and pendulous position of the parts, so as at length to attain an enormous bulk. Its seat is in the cellular tissue of the scrotum and it sometimes commences in the loose texture of the prepuce, though in the larger growths, I have generally found the skin

* See Dr. Wise's paper vol. VII. part I. Transactions Medical and Physical Society of Calcutta.

of the prepuce healthy, elongated, and stretched forward. Plate II. fig. 1, is a correct representation of the first tumor of this description on which the operation was performed in Calcutta, the weight of which (after the separation of its fluid contents) amounted to 56 lbs, and its circumference to 55 inches in measurement. The disease had existed for about five years, but had considerably enlarged of late; the patient who was about 36 years of age was in great misery and alarm at his unsightly appearance, and the great inconvenience he experienced from its weight. The parts of generation were completely lost sight of and buried in the preternatural mass. The urine passed through an opening not dissimilar to a navel. The lower extremities were anasarcaous, owing to the great dragging and pressure of the swelling, obstructing the veins and absorbents. He was able to walk in a slow swinging manner, the tumor hanging down to the calves of his legs. The operation is performed in the following manner.

Preliminary measures.—A large sedative dose of laudanum, not less than 90 or 100 drops should be first administered, and a staff should be introduced through the opening leading to the penis.

The patient being laid on his back on a table, with the lower extremities widely separated, the tumor should be turned over the abdomen to allow of the veins being somewhat emptied of their contents.

1st stage.—A large *semicircular* incision should now be commenced on the posterior part of the tumor

with its convexity *forwards*. This accomplished, the tumor should be turned down. Two *longitudinal* incisions are then made about three inches apart, commencing from the neck of the tumor on each side, corresponding with the pubis, and extending in a *parallel* direction for about three inches. Their inferior extremities are met by a *horizontal* incision. Two *elliptical* incisions with their convexities *outwards* are now accomplished on each side, commencing from the same point, and terminating at the posterior incision. Hæmorrhage is suppressed by the fingers of the assistants.

2nd stage.—Two bold and deep *perpendicular* incisions are now to be made through the mass, down towards the tunicæ vaginales, which with a little dissection are to be exposed and extricated but not *opened*, they are then to be dissected up towards the external abdominal ring and held back by an assistant over the abdomen.

3rd stage.—The flaps are all dissected back. A *circular* incision of the diameter of a crown is to be now made around the urinary opening, and the elongated and almost always healthy prepuce is to be carefully dissected down to the glans penis. This is most *important*, and, if done carefully, will form a complete and natural covering to the penis when reflected back upon it, vide Plate II. Fig. 4 which exhibits the elongated prepuce in *a*. One bold incision down to the body of the penis will facilitate this dissection.

Appearance of the exposed parts.—The parts as they

are exposed at this period of the dissection assume a very beautiful appearance; the spermatic chords greatly elongated, the transparent tunicae vaginales with their vessels ramifying on them and distended with fluid, the corpora cavernosa et spongiosa covered with ligamentous sheaths being all clearly exposed, untouched by the knife.

Conclusion.—The remaining attachments of the tumor are now easily separated by a few strokes of the knife; and the hydroceles should be now punctured to evacuate their contents.

Dressings and after treatment.—The lateral and posterior flaps are now united by sutures, and adhesive plaster, or, which is preferable, the isinglass plaster. The pubic flap covers the root of the penis, and the loose *elongated prepuce* is reflected back to cover the body of the organ.

Great care should be taken to receive the urine when voided. The patient should be laid on his side, propped well with pillows, and every measure taken to favor the adhesive process.

Concluding observations.—Hydroceles will almost invariably be found in both tunicae vaginales, and there will generally be a considerable quantity of fluid in the substance of the tumor itself, escaping during the operation. The growth itself will be found to be a yellowish hard substance of fibrous consistence and creaking beneath the cutting instrument. The chords were thirteen inches long in the first

case in which the operation was performed, the testicles were sound and of a perfectly natural size. The disease is totally divested of all malignity, and the whole of the generative apparatus may be with safety preserved. The affection is readily and completely remedied by excision, as thus described. The processes of adhesion, granulation, and cicatrization render the part compact, and further morbid development has not been observed to follow. A sort of artificial raphe is formed by the union of the lateral flaps, and the subsequent contraction.

Improvements in the operation.—The chief improvements in the operation over those which have been performed in other parts of the world are—1st. The preservation of the *entire organs of generation*; and 2nd that the *prepuce* (which is reflected forwards) being generally healthy, elongated and loose, can, in most cases be dissected backwards, and preserved to form a delicate and flexible integument to the penis, (vide Fig. 2 and 3) which the dissected flaps are too thickened to be capable of doing.

Results of the operation.—Of the seven operations which were performed in 1837, two died of mortification of the wound, but it occurred during most sultry weather in a Bengal climate, and in a very crowded hospital, when other abraded surfaces were putting on a gangrenous aspect, and it cannot be too prominently dwelt upon as a subject of regret. It must be incul-

cated as a principle never to operate excepting during the cold or temperate weather.

The other five recovered, although one of them, the first, after being discharged perfectly cured, returned to hospital with dysentery, and died about three and a half months after the operation, from symptoms totally unconnected with the disorder for which he was successfully operated on. The functions of the organs are restored, at least if we may credit the statements of the patients themselves.

The operation has since been performed by Drs. Goodeve and Stewart in Calcutta, the result of which was made known to the public, and by F. Corbyn, Esq. who took charge of the Central Hospital on my departure to the Upper Provinces with the Governor General. The following are Dr. Corbyn's observations on this subject in the Medical, and Physical Journal.

“We have performed the operation four times, but our experience induced us to make some alterations, to guard against a disposition there is in some patients to sloughing of the skin; we determined to remove the skin altogether. In the first case, the tumor was small, and proved a very interesting operation. We dissected the diseased mass from the tunica vaginalis of both testicles and presented the tunics greatly distended with gelatinous matter highly and beautifully vascular, we then opened the morbid tunic and came down to the testicles with their healthy and fine covering of the tunica albuginea; we now dissected these from their morbid

attachments and placed them over the abdomen, in possession of our assistants, then cleared the penis, and finally removed the morbid mass. Thus there was not a particle of disease or diseased skin remaining; an immense quantity of healthy pus formed on the tunics and we had a healthy and fine covering. The other case was a tumor about 25 lbs; we performed the operation in the same way but found in this two hydroceles, which we separated in the first place from the diseased mass. On opening them, nearly three pints of water was discharged, the spermatic chords were about seven inches in length and the penis shrunk to one third of its natural size. The tunica vaginalis was so hardened and thickened that there was much difficulty in cutting through it."

The disease is extremely common in damp and warm climates, the relaxing effects of which doubtless favor their greater development. In the first seven operations performed by myself at the Central Hospital and Hospital of Surgery in Calcutta, the aggregate weight of the tumors, when divested of their fluids, amounted to 280 lbs. They do not appear to be confined more to the sedentary than the laborious classes of individuals.

Hypertrophied pudenda.—A similar enlargement is by no means uncommon in the pudenda of females in Hindostani, and has been removed by operation by Dr. Butter, Mr. Greene, and others. A still more hideous form of the disease affects the prepuce alone but it is not necessary to give a drawing of it. It is easily excised.

The disease is so very common in the lower extremities of the Bengalies as to be seen almost daily on visiting any part of the city.

The disorder has been erroneously termed *elephantiasis*, but it has no connection with that tubercular disease. It is a pure vascular sarcoma, with hydroccles, and is evidently the same disease with that which occurs in the West Indies, in Africa, Ceylon, and occasionally in Europe, and which has occurred in the practice of Delpech, Liston, Clot, and other surgeons. The state of the parts previous to and during the operation is delineated in Plate II. Fig. 1 and 3.—Fig. 3 represents the appearance after dressing the wounds and reflecting the elongated prepuce. Fig. 4 is a diagram given to explain the manner in which the prepuce is elongated forwards *a a*—as far as *b* the urinary fissure; *c c* the situation to which *a a* is to be reflected back, *d* the pubic flap.

Figs. 3 and 4 are modified from Delpech to shew the improvements now suggested. It should have been observed that the veins are enormously enlarged, but the arteries are small and not particularly numerous.

This *sarcomatous* form of tumor not only occupies the cellular tissue in various parts of the body, assuming externally more or less of a globular figure, but is liable to affect the glandular structures, especially the mammæ and the *testes*, and likewise the absorbent glands, which gradually enlarge with little or no pain and become of a soft consistence. The substance of

these tumors is penetrated throughout by vaseular condensed cellular structure, which ultimately becomes fibrous and in which they are nourished. They are frequently of a lobulated form.

These productions are also sometimes situated on the nose under the designation of *lipoma*, invading one or both sides of the nostrils, and as they enlarge become of a purple color with considerable development of the mucous follicles, which emit sometimes a profuse discharge. The follicles are occasionally enlarged to such an extent as to admit the point of a crow quill. Turgid veins ramify on its surface. The inconvenience and deformity is often very great, presenting a number of unsightly lobules, to the impediment of the patient's eating or even respiration. The disease is not of a specific character and is confined to the integuments. It may be easily extirpated by dissecting off the whole of the diseased integuments, treating the denuded surface on the usual principles applicable to ulcers. A considerable number of vessels may require to be tied.

2. *Adipose sarcoma*.—The composition of these tumors is precisely similar to the adipose substance in other parts of the body. They are generally seated superficially, and are surrounded by a thin capsule of cellular tissue to which they are but slightly adherent and are of a lobulated figure at the base. Their vessels are generally firm, and they form slowly and without pain, producing no inconvenience excepting from their bulk.

From their simple unirritating character they are frequently allowed to attain an immense size, the lobules insinuating themselves between the muscles amongst nerves, bloodvessels and other important parts. The largest related was removed by a French surgeon weighing 46 lbs; And others of considerable dimensions have occurred in the practice of Sir Astley Cooper, Mr. Copland, Hutchinson, and other surgeons.

The removal of such tumors is easily accomplished by excision, unless they have been subjected to much *pressure* and inflammation, when they become considerably adherent to the surrounding textures and are far more vascular. They are liable under such circumstances to degenerate into a malignant character. Such a result is occasionally induced by a native practice of producing an ulcer by the application of escharotics, and even of the actual cautery, in consequence of which they often suppurate and degenerate. It is no uncommon circumstance to witness a large cicatrix in the centre of these tumors when presented for operation.

There are instances of great numbers of these tumors existing in various parts of the body. An instance has already been alluded to which occurred at Delhi, see Plate III. Fig. 1 and 2, and the representation of *several such tumors* on a female quoted by Mr. Samuel Cooper from Walther is well known.

I have seen these adipose tumors covering the whole body *accompanied by* pendulous tumors involving the

eye-lid and corresponding side of the face, which has been denominated molluseum by Bateman. A case of molluseum somewhat similar to these without the concomitant smaller tumors is described by Dr. Adam in the Transactions of the Medical and Physicall Society. I have ascertained them to be sometimes hereditary. Vide case published by myself in the India Journal of Medical and Physicall Science for June 1839.

3. *Fibrous sarcoma* is formed in various textures, and is not uncommon. It is of a dense consistence, intersected with firm ligamentous fibres, and of a dark color. It is intimately adherent to the surrounding cellular texture with which it is enveloped. It is of an unmalignant character, though apt to degenerate if not removed. Portions of osseous and cartilaginous substance are often disseminated in its texture; and sometimes it is interspersed with cells.

It is impossible scientifically to classify the number and variety of these unmalignant tumors. Some are of a white cartilaginous consistence, others are entirely osseous, and some fibrous and glandular. Of such a nature was one I dissected off the carotid artery in a patient in Calcutta. Cysts lined with a delicate smooth membrane are generally found in these tumors containing sometimes a glary fluid, or bloody purulent or curdy matter. Some are pure blood, and in others a black fluid, is found, or a dense elastic substance pervades the mass. They are generally more or less tuberculated, or lobulated. They often remain inert for several

years but occasionally grow with rapidity, vide a curious specimen Plate IV. taken from the leg of a peasant at Cawnpore, of an innocuous description, which had existed for ten years, and appeared to have originated in a similar manner to that of the above class of benign tumors. It was partly cartilaginous, partly fibrous and glandular; containing several cysts some of which were filled with a dark colored pulpy matter, some with grumous blood and others with serum, the contents of a small egg-shaped appendix at the lower part were of the same nature as the last mentioned fluid.

4. *Encysted tumors*.—The next form of local and innocuous tumors which falls under consideration is the *encysted*. They may occupy any texture of the body, and their cysts though varying in consistency, are composed generally, of a dense membranous bag. They receive different designations from the nature of their contents. *Meliciritous* from containing a substance like honey. *Atheromatous* consisting of a curdy matter. *Steatomatous* containing a partly liquid and partly solid substance like fat. The contents may somewhat vary from either of these descriptions, being sometimes composed of a turbid fluid, at other times gelatinous, occasionally hydatids, or perhaps calcareous matter. Lastly, their contents may be purulent, from the supervention of inflammation and suppuration.

Their supposed origin.—These tumors have been discovered by Sir Astley Cooper to consist of enlarged subaccous follicles which have become obstructed by

hardened and vitiated secretion. On the surface towards the skin we commonly discover a minute point, which on accurate examination with a probe or pin will be found to admit its introduction into the cavity of the cyst and their contents may be squeezed out by pressure. The contents indeed generally correspond in appearance with that which may be squeezed out of the follicles of the nose in some individuals. In further proof of this conclusion it is observed that the lining of these resembles the continuation of the cuticle, and they not unfrequently contain hairs, though these are without bulbs, and are rolled up in a globular form, occurring generally about the eyebrow in such cases. The doctrine, however, of their follicular origin cannot be universally maintained, for they form in situations where there are no follicles. Another curious fact is the existence of similar tumors in the inferior animals, containing the hair peculiar to their bodies, as wool in sheep, &c. It occasionally happens that these encysted tumors ulcerate so as to expose their interior; their internal cuticular lining becomes dry, and assumes the appearance of horn from the secretion of cuticle in successive layers; and there have been instances witnessed of a considerable projection of such horny production growing the length of a finger, or even still longer, projecting in a tortuous manner and resembling somewhat the horns of inferior animals.

Encysted tumors are often *hereditary*, generally occurring about the superciliary ridges, covered by the orbi-

cularis or occipito-frontalis muscles, and adherent to the bone, though not confined to such situations, but liable to be found in any part of the surface of the body.—Violent inflammation and suppuration with severe constitutional irritation, and fungus growth may be the consequences of openings being made in these tumors, rendering all such attempts hazardous.

They are said to be *occasionally* susceptible of *absorption*, but generally the only effectual mode of getting rid of them is by the knife.

The loose cellular and adipose tissue of the orbit is frequently the seat of these productions. The best mode of removing these tumors will be hereafter explained.

5. *Simple Polypus*.—Polypus is either of an *innocuous* or *malignant* character. The former only falls under the present Sub-Section of our classification. It is found growing from the mucous membrane of various parts of the body, the latter is peculiar to the mucous membrane of the nostrils, taking place under various circumstances, and presenting different symptoms.

Simple polypi are of a pyriform shape, and attached to the mucous surface by a narrow pedicle. They are divided into the *gelatinous* and the *sarcomatous*.

They produce no inconvenience in their early stage, but as they enlarge they fill up the cavity and impede the functions of the parts from which they grow. Their bulk is much influenced by the atmosphere, swelling considerably in moist weather, and contracting when the air is dry. They are of a greyish semi-transparent

appearance resembling jelly, are not possessed of much sensibility, and are but imperfectly organized, though minute vessels are occasionally seen ramifying on their surface. They seem to consist of a serous fluid enclosed in mucous membrane, of a delicate or strong appearance, and moistened by mucous secretion. Polypi generally occur in clusters suspended from a common base; occasionally there is only one.

They are sometimes permitted to attain such a size as mechanically to distend the cavities in which they reside, as in the nostrils, when they produce considerable inconvenience from pressure, obstructing the ducts of the nostril, and impeding the progress of the tears, or there may be deafness from pressure on the extremities of the Eustachian tubes. They may press down into the soft palate, pass backward into the posterior nares, and into the pharynx. Nasal polypi are most frequently situated in the parietes of the narrow passages between the anterior and posterior nares, and their peduncles or bases arise from the turbinated bones. Considerable expansion and deformity of the nose may be the consequence of neglected cases. The respiration, and sense of smelling is often impeded.

Treatment.—Polypi if carefully and completely eradicated are seldom reproduced, but if any of them are suffered to remain, or are incompletely extracted they will be reproduced. The best mode of removing polypi from the nostril is with a very small pair of Polypus Forceps, long, slender, and of considerable strength and a

vulsellum. The patient being seated before a clear light, the tumor is seized by the vulsellum; as represented, see Plate V. fig. 1 and 2, copied from Lizars. The forceps are then introduced, expanded, and directed towards the neck of the tumor, which is firmly grasped by the instrument, and gently twisted so as completely to detach it at its root; without using any jerking or force, two or three more introductions may be requisite so as to complete the removal of all vestiges of the polypi. Examination should be made with the little finger which can readily be introduced into the nostrils (already preternaturally dilated by the disease) so as to ascertain that all has been removed, or to direct the operator in his further search after any remaining portions.

Hæmorrhage is to be suppressed by the introduction of long pledgets of lint. Should this be ineffectual, a loop of thin flexible wire should be introduced, along the floor of the nostril, and brought out by the throat, introducing a pair of forceps or a hook for that purpose. A piece of long thread is then attached to the wire and the latter is withdrawn; one extremity of the thread hanging by the nostril and the other by the mouth. A piece of lint about the dimensions of the first joint of the thumb is now to be attached to the thread and carried to the posterior nostrils into which it is firmly fixed by pulling the thread. The size, however, of the lint should be proportioned to the capacity of the opening into the posterior nares, and to the age of the patient. Both nares may require to be closed in this man-

ner. The anterior opening of the nares is also to be closed with lint. The posterior plug can be removed by drawing the extremity of the string remaining in the mouth. Such apparatus should be in readiness before hand.

The above practice is valuable in cases of epistaxis.

The operation may be required to be repeated on a return of the disease of which it is prudent to warn the patient.

To obviate this it is desirable slightly to touch the surface from whence the excrescences hung with the nitrate of silver repeated at intervals, or even to employ the potassa fusa conducted carefully to the part. It is in many instances requisite to employ the speculum nasi in a bright sunshine, when the polypi do not project at the anterior aperture.

Some are so far back in the nostril, as represented in fig. 2 that they hang down behind the velum into the pharynx, and excite coughing. These are, for the most part, larger, of a firmer consistence, and single ; I have seen but one patient with two such tumors. The greater number can force them, when small, so far forwards into the nares, that they may be reached from the anterior aperture, as already described.

When a large fleshy polypus hangs down behind the velum, it requires to be noosed with silver wire, inserted in a double canula, the free ends being out at the rings *a, a*. The noose or loop, scarcely projecting, is conducted, through the medium of the canula *b*, along the

floor of the nares, close to the septum *i*, until the rings approach the anterior aperture; then the wire is to be slowly pushed backwards along the tubes, so as to project behind the velum, when it must be seized by the fingers or forceps *c*, next fingered into a loop, carried round the bulbous base *d*, of the tumor, and then up along its sides to the pedicle *e*; the wire is now to be gently tightened, by drawing both ends equally, and afterwards fixing first the one to a ring *a*, and then the other taking great care not to twist it, as it readily breaks. Some difficulty is experienced in getting the noose of the wire down behind the velum, but the fore and middle fingers of the left hand will be found the best instrument, superior to all the hooks invented, while the other end of the canula, with the rings, is held firmly with the right hand, thus forming a correspondence of feeling between the two hands. Difficulty is also felt in the conducting the noose of the wire round the base *d*, and upwards along the sides of the tumor to its root *e*, which difficulty will be found to be best overcome by the same fingers, likewise preferable to the forked probes, hooks, and all such contrivances. The operator judges of the tightness necessary to strangle the circulation of the tumor, by the pain complained of, and by the sneezing excited. Some prefer cat-gut, strong silk ligature, or whip cord, to the silver wire, and a single to a double canula.

To avoid inflammation, the patient should remain quiet, and have his diet and bowels regulated. On the

third day, when suppuration shall have taken place, the wire should be tightened, by undoing carefully the one end, pulling this gently with pliers, and again twisting it round the ring, being careful not to twist the wire otherwise. If within two days the tumor have not dropt off, this should be repeated, and so on until it fall away. During this treatment, there is an offensive discharge, which may be rendered less so by the inhalation of the steam of hot water, containing a little of the solution of chloride of lime. When the tumor comes away, the steam should be persisted in a few days, and then the part should be touched with the nitrate of silver.*

When a polypus is firm and fleshy, with a broad attachment, the forceps fail to bruise and tear it away, and the ligature cannot be got high enough to noose it; in which case, a small probe-pointed knife is carried flat along the side of the tumor to its root, and then the cutting edge applied, by which excision is accomplished. Smart hæmorrhage commonly follows, which is checked by stuffing the nostril from the anterior aperture, as recommended for epistaxis; and if this fail, the posterior aperture also must be plugged. Various useless instruments with springs have been invented. On the fourth day, the surface should be touched with the nitrate of silver or the potass, which must probably be repeated more than once.

* Mr. Lizars.

If the tumor is of a malignant character, it is doubtful if any application will suffice; but from my own experience, and that of Mr. Lizars, there are few so malignant, except those accompanied with medullary sarcoma of the maxillary sinus. I have seen the countenance horribly disfigured even by benign polypi; both eyes projected outwards at the temples, with a staring amaurotic aspect, and but the tip of the nose was perceptible when death occurred.

Polypi now and then grow from the mucous membrane of the maxillary sinus, but these are not discovered until its osseous walls have been absorbed, or forced outwards, either forwards at the cheek, upwards towards the orbit, centrad towards the nostril, or downwards to the palate, or in all these directions at once. The greater number of such tumors is malignant, and hence, unless excised very early, the disease returns, and proves quickly fatal. This cavity is much more liable to medullary sarcoma, which also is seldom ascertained until beyond the aid of the knife. I saw one case, where the tumor sloughed and suppurated away. Mr. Lizars has also seen two acute cases, where the antrum, full of pulpy substance, was actively inflamed, into which a probe could be pushed through in every direction; of these cases the most unfavourable prognosis was formed, but the individuals recovered. This disease is sometimes mistaken for a species of epulis.*

* Mr. Lizars.

The uterus, the antrum, the meatus auditorius externus, the œsophagus and sometimes the rectum are occupied by these morbid growths.

Similar principals of practice are applicable to the affection in these parts. Polypi of the uterus are removed by ligature. A fine, and strong silver wire, or catgut is noosed round the base of the finger, and pushed round the origin of the growth. The ligature is then passed through a canula, or along a strong probe, with a ring at each extremity, to the lower end of which it is secured. Polypi in the rectum are treated in the same way.

Very delicate forceps are requisite for the removal of polypi of the auditory canal.

Attempts may be made to extract polypi from the œsophagus when situated near the pharynx, but they are removed with difficulty.

SEC. II.—SIMPLE GLANDULAR ENLARGEMENTS.

1. *Bronchocèle*, as the simplest kind of morbid structure affecting the substance of a gland, naturally falls next under consideration in the present plan of classification. It is exceedingly common at various localities throughout the range of the Himalayan mountains, and I have occasionally met with it in the Gangetic plain in the vicinity of the Turaec. At Almorah I have usually observed one individual out of every ten

affected, and I believe it is equally prevalent at Nipal. I have not observed it to be accompanied by those peculiarities of countenance and mind remarked in the neighbourhood of the Pyrenean and Alpine Mountains, under the designation of Cretinism, neither is such stated to have attracted the notice of McClelland, Campbell and Bramley who have all contributed much valuable information on the subject of this interesting disease, in the Trans. Med. and Physl. Soc., Calcutta.

Symptoms.—The disease generally commences early in life, affecting both sexes indiscriminately, and may attain to very considerable dimensions without greatly incommoding respiration or deglutition, and whilst the patient is in every other respect in the enjoyment of perfect health. There are however exceptions, where the respiratory functions are much incommoded, especially on exertion, and where the *isthmus* of the thyroid gland is the most developed.

The carotid arteries are observed to pulsate fuller than natural, and the thyroid arteries are greatly enlarged in the advanced stages of the disease. The consistence is soft and yielding, the integuments are thin and moveable, and large veins shine through them. The progress of the affection is slow.

The structure generally consists of a viscid transparent semi-gelatinous fluid contained in small cells, not exceeding grains of mustard seed in dimensions, but occasionally they are sarcomatous.

Bronchocele is congenital in animals in Nipal. Al-

most the moment the animal is born it expires. We are indebted to Dr. Campbell of Katmandoo, in Nipal,* for a very satisfactory pathology of the affection as it prevails amongst goats and sheep. He invariably observed a complete want of development in the muscles leading from the sternum to the os-hyoides and thyroid cartilage, whether from pressure of the tumor on these parts during gestation which he supposes, or from diversion of nutrition to the morbid growth, it is difficult to decide. The reader will be gratified by the perusal of Dr. Campbell's paper in the 7th volume of the Medical and Physical Society's Transactions, part the 1st. The suddenly fatal effect on the animal, a few seconds after its assuming a new state of existence, must be attributed to pressure on the respiratory passage.

With respect to the *exciting cause* of goitre with a view to its prevention and cure, the profession is highly indebted to Dr. McClelland, and Dr. James Inglis (ably reviewed by J. Grant, Esq.†) where and it is singularly corroborative of the true cause of the disease that both should have come almost simultaneously to the same conclusions from their geological acquirements at two such remote parts of the world as England and the Himalayas. I shall exhibit their joint conclusions in the way of aphorisms, amounting to almost mathematical and geological demonstration.

* Now Political Agent and Superintendent of Darjeeling.

† India Journal of Medical and Physical Science.

1st.—Snow water alone is not sufficient to produce goitre seeing it is never met with in Greenland, and Lapland. In Sumatra, on the other hand, where snow is never found, Bronchocele abounds; but snow water, though in itself innocent, may like other water, be the medium, or vehicle by which the cause is conveyed into the system.

2nd.—In primitive districts where limestone does not exist as a principal rock formation goitre is not found; or if found, it is only in the proportion of one to five hundred of the population.

3rd.—In transition and floetz districts where limestone prevails, one seventh of the whole population is affected with goitre.

4th.—In districts 3, the population is not equally affected in every village; but one village is affected in the midst of others which are healthy, and vice versâ.

5th.—That goitre does not depend on temperature, altitude, or aspect of irregularities on the surface of the earth, or hereditary taint, nor on the usual causes of glandular enlargement in other parts of the body.

6th.—That those villages, in which goitre exists, are always erected on, or in close vicinity to, great limestone formations; and that the water is always furnished, for the use of the inhabitants of such villages, by springs which are derived from limestone rocks; and this has invariably been remarked by McClelland over a space 1,000 square miles.

7th.—That the morbid principle in the water is re-

moved or modified, according to the distance it runs, in channels of alluvial earths, impregnated with animal or vegetable matter, before taken for use.

Lastly.—The lowest caste of persons in the Himalayan mountains are more subject to the affection than the higher orders, owing to the poverty of the former compelling them to use more water, and less milk than their superiors, as well as the prejudice of the Hindoos of these hills which refuses to the lower castes the privilege of partaking with their Brahmin and Rajpoot neighbours of the waters of the same spring. The excluded castes are therefore compelled to use this fluid from impure sources.

Mr. McClelland's memoir contains a tabular statement of about 44 villages exhibiting the number of Brahmins and of low castes, the rock from which the water is derived supplying the village, the proportion of high to low castes affected with the bronchocele &c. The result is that 50 per cent. of those who inhabit limestone rocks are affected with the disease, whilst only one and a quarter per cent. of those who inhabited clay slate in the same vicinity are affected.

Mr. McClelland has not remarked the disease to be hereditary.

With respect to the *proximate cause*, not the slightest light has yet been thrown on its acting so exclusively on the thyroid gland.

Prognosis.—Goitre must be considered as a disease calculated to shorten the life of the individual, and, pre-

disposing to disease of the heart, phthisis and other pulmonary affections with a tendency to apoplexy.

Treatment.—The removal of the exciting cause is the first important point to be attended to, a prophylactic measure which will be generally practicable.

The most successful remedy is iodine as a most powerful agent on the absorbents and for rousing the energies of the whole system. Internally it may be administered in solution, or the tincture diluted, the dose being gradually increased; and externally according to the following formula :

R.	Potassæ Hydriodatis	ʒss.	
	Iodine	ʒj.	
	Adipis Suillæ	ʒj.	M.

Leeches and scarifications may be also employed.

Possessing such a specific, it will be unnecessary to allude to the various attempts for its removal by extirpations, tying the thyroid arteries &c. proceedings now rendered totally unjustifiable, “but it happens occasionally that enlargement of part of the gland, as the isthmus or middle slip, gives rise to difficult respiration, to fulness of the vessels of the brain, and an alarming train of symptoms; under these circumstances, the offending part, if it have resisted the action of iodine and other deobstruents, may be made the subject of operative procedure. The introduction of a seton has been resorted to, but this practice is not unattended with risk, and its operation is slow and uncertain.*” Mr.

* Liston.

Liston has more than once removed large portions of the thyroid body, which has caused serious inconvenience, and with the most perfect safety, by combining incision and ligature. The accompanying sketch (see Plate V. fig. 3, taken from Liston) exhibits the situation and character of bronchocle well; the scar upon its surface shows where a tumor, nearly equal in size to that remaining, and which caused much annoyance from its pressure and projection, was removed from, in the manner here described. "The coverings of the tumor are divided fully and turned back, the dissection is continued towards the base of the mass, as far as it can be done with safety; strong needles fixed in handles, are passed underneath, from above downwards, and from the side, crossing the first at right angles, care being taken not to wound or include any part of importance. Very strong ligatures are drawn through in the loops of the first introduced, and these are tied on each side, or the ends are secured all round, the one to that next to it, whilst the ligatures are tightly held; by the pulling and securing the last very forcibly, all the knots are drawn together under the tumor, as represented in the sketch fig. 4, so as to strangle it effectually; in fact, the four ligatures are knotted in such manner as to make one, and, by drawing the last two ends firmly, the strangulation is rendered complete. The reef-knot must be used for this purpose, and even a third knot should be made to prevent the ligatures slipping during the firm and strong pull upon the last two ends. In

passing the ligatures under these and other tumors, it is advisable to introduce the first needle unarmed; then beneath it to pass a second carrying a ligature; the loop of the ligature is taken hold of, and this second instrument withdrawn; the first one is now threaded, and by its removal the second ligature is carried through; by this means their entanglement is avoided."*

There is a curious form of *pendulous tumor* affecting the ears chiefly of females in Nipal, and Dr. Campbell has also given a drawing of a curious pendulous tumor descending to a considerable length from the Mamma of a Nipalese lady.† Whether the great tendency to such tumors in the valley of Nipal (where Bronchoccele also is so common) are attributable or not to the same exciting cause, viz. the impregnation of the water with lime it is difficult to say. But traces of carbonate of lime were discovered on analysis. There is indeed but a very small appreciable quantity of lime in the water used by the inhabitants affected with bronchoccele, but as Mr. McClelland justly observes, a noxious principle which required *years* to develope a local effect on the glands on the neck might easily escape detection, even by the most careful analysis.

2. *Tumor of the parotid gland.*—As a variety of glandular tumor of somewhat peculiar structure, and

* Liston.

† India Journal of Medical and Physical Science.

certainly of benign character in its incipient stage, but liable in the advanced stages to degenerate into a malignant ulcerating cancer and sometimes melanosis, is the indurated enlargement of the parotid gland.

There can be no question that many of those tumors which have been extirpated from the situation of the parotid gland have originated in the lymphatic glands, or in one of them lying on its surface, and I have myself had occasion to remove tumors from the neck arising, no doubt, in the lymphatic glands, and which belong to those classes of tumors already treated of. But there can be now no question both from the previous history and from the undoubted testimony of many eminent surgeons that the parotid gland has not only been the seat of the disease, I am now speaking of, but that it has also been successfully extirpated, notwithstanding the opinion of Mr. Allan Burns that it is impossible to be effected. The following case which occurred to myself must place the question beyond all dispute.

The patient was an interesting young female of 17 years of age. The disease commenced five years ago by an inflammatory swelling in the region of the parotid gland: an abscess burst, and continued to discharge for some time from the meatus auditorius. This subsided, but the swelling increased, and the abscess then obtained an exit by the parotid duct. On the cessation of this, the tumor rapidly increased, until it acquired such a size as to occasion great deformity and to impede

the functions of deglutition and voice, and was attended with considerable pain; the integuments were perfectly healthy.

Some of our best surgeons deny the necessity of securing the carotid artery, whilst others of equal celebrity advocate the expediency of so doing.

In the case I am about to describe, a ligature of reserve was introduced under the carotid artery.

The operation for extirpation of the tumor was then commenced through the integuments and platysma myoides muscles by two semi-elliptical incisions extending from the zygomatic process to the inferior part of the tumor, and with a little dissection, the whole extent of the tumor was exposed. The lateral attachments were dissected, and the tumor was laid hold of, and detached from its firm connections, a great part of which was effected by the finger. The hæmorrhage was thus far but slight, the few vessels which were wounded being easily secured at the moment they were divided, and nothing of moment occurred, until the dissection was carried to the deep attachments at the base where it encircles the artery. At this point, in an instant was the patient almost deluged in a torrent of blood chiefly from the external carotid. She swooned, and an involuntary discharge of urine and fæces took place. In a moment the ligature on the common carotid artery was secured, which was followed by instantaneous cessation of the hæmorrhage. The patient shortly revived from the syncope, and completely recovered; without

the occurrence of any subsequent hæmorrhage. The dissection clearly exposed, in this case, the posterior belly of the digastricus. The transverse processes of the cervical vertebræ, the mastoid process and meatus auditorius on the one side, and the angle of the jaw with part of the masseter muscle on the other, and the hyoid and pterygoid processes were distinctly felt. The circumstance of the early abscess discharging itself through the parotid duct appears to me diagnostic.

The wound completely healed chiefly by adhesion, and partly by cicatrization, and the girl presented herself to me, some months afterwards, in perfect health.

I was assisted at the operation by Mr. Corbyn, Garrison Surgeon of Fort William.

The structure of the tumor was partly glandular, and partly of an indurated scirrhus character having several small cysts throughout its substance containing purulent matter. The lobules of the conglomerate parotid were quite distinct, and its figure and superficies entire and well defined. It was examined by Dr. Goodeve, and myself, and I think that gentleman has preserved a preparation of it, in the Calcutta Medical College.

Branches of the portio dura of the 7th pair of nerves were unavoidably wounded, in consequence of which there was paralysis of the muscles furnished by these motor nerves.

Remarks.—In this remote part of India, I have not the means of access to all the various authors who have written on the subject, but from the numerous instances

which have now been recorded of the removal of this gland, it would be absurd to entertain any doubt upon the question. Mr. Allan Burns in his able work on Surgical Anatomy of the head and neck states, that it is impracticable from the connections of the gland. He tried the extirpation on the dead subject, but found the diseased substance so niched in to every interstice around that he could not succeed, and he is of opinion that those who have supposed that they have extirpated the parotid gland have mistaken that conglomerate gland which lies imbedded in its substance, and which does sometimes enlarge. Bell says, that the cutting out completely of the parotid gland is quite impossible, since the greatest of all arteries, viz. the temporal and the internal maxillary lie absolutely imbedded in the gland. Sir Charles Bell states, that he assisted his brother at an operation of this kind where the whole gland was diseased, and in which it was deemed requisite to place a ligature round its base, where it encircled the artery. Quain also, in his work on Practical Anatomy says, that it is impossible in the living subject to dissect out the body of the gland and its various deep seated processes.

In the Medico-Chirurgical Transactions, (vol. 7, p. 112, and vol. 8, p. 582,) a case is recorded in which the parotid was entirely removed by Dr. Goodlad. The patient it appears died. Mr. Carmichael (Transactions King's and Queen's College of Physicians, vol. 2. p. 101,) also removed a large tumor involving the paro-

tid, and connected with the transverse process of the atlas, the basis of the skull, the meatus auditorius, mastoid process and angle of the jaw, this case terminated successfully. Klein also removed an enlarged parotid gland with success. It has been extirpated three times by Professor Weinhold of Halle, and by Professor Beclard. Besides which, the operation has been performed by Dr. Mott, Lisfranc.* and several other surgeons attended with various results, and some I fear unjustifiable, when in the ulcerated stage and accordingly hopeless, but the dissections of the tumors, (especially that of Lisfranc's in the French Academy of Surgery) have no doubt that they were tumors of the parotid gland. The result of all their evidence is that, if early undertaken, a painful death is prevented, and also that the hæmorrhage was so extensive in almost all these cases as to render it highly necessary for the preservation of the patients, that the carotid artery should be previously secured by ligature.

The above is quite sufficient to satisfy the most sceptical and indeed "*a priori*," I cannot see why the parotid should not become sometimes the seat of morbid degenerations as well as any other conglobate and conglomerate gland, and as Dr. Weinhold† observes, if people permit themselves to be led into errors by every thing that is said and written in the world, science will never make any progress. It appears then

* Lancet.

† Journal Complimentaire.

that this operation is dangerous, but not impracticable, and that all which is requisite is, a perfect knowledge of the anatomical disposition of the parts, and practice on the dead subjects.

It would be desirable in future operations of this kind to try the effects of compression by the finger of an able assistant on one or both carotids in hopes that the more serious measure of passing a ligature round the carotid artery may be dispensed with, but I have my doubts, knowing as I do that one of my most skilful friends in this country lost his patient from hæmorrhage by trusting to temporary compression.

Rather than lose any information which might be valuable to the surgeon in these operations, I have much pleasure in quoting the observations of that truly able surgeon Mr. Liston. His remarks are as follows:—

The tumors over the parotid, and behind the ramus, and angle of the jaw, deserve some notice. These, whether enlargement of the lymphatic glands, or adventitious formations, are bound down by a strong condensed cellular sheath or fascia, and also by the fibres of the platysma-myoides, which pass upon the side of the face. This growth and prominence, externally, is equally extensive among the deep-seated parts. The parotid gland is displaced and absorbed; the diseased mass is imbedded in its substance, and ultimately occupies its place. The vascular supply is abundant and the nerves become intimately attached to the pos-

terior surface of the condensed cellular cyst. The tumor is firmly fixed in all ways, by its strong investments, firm adhesions, and by its being, as it were, dove-tailed by its processes between the bones. I have sometimes, after the removal of tumors of long standing in this situation, found exposed the whole cavity betwixt the mastoid process and the ramus of the jaw, the styloid and pterygoid processes, muscles, &c. The interference with these growths, parotid tumors as they are called, (though the parotid gland, I believe, is not in itself very subject to disease, it must be extremely rare at all events,) requires no small degree of consideration; if there be reason to suspect that the disease is of a malignant nature, and not thoroughly limited by a cellular cyst, no interference is admissible. If, on the contrary, it be at all moveable, has advanced slowly, possesses a smooth surface and is firm, (neither of stony hardness nor pulpy,) then the operation may be contemplated. A very free division of the superimposed parts is essential to the success of the proceeding. For this object a perpendicular incision is first made, and others added so as to form two or more flaps; the incisions must penetrate to the substance of the tumor, and divide its immediate investment; it being a more easy matter to turn a diseased part out of its cellular cyst, than to dissect that out from the parts to which it adheres, and from whence it draws its supplies.

The dissection should now be carried deeply to the

lower boundary of the disease, where vessels are known to enter; these will at once be divided and compressed, or tied if it be thought worth while, if the vessels be very large, or the fingers of the assistant are in the way of the further, and perhaps more delicate, dissection; this is pursued much more safely and satisfactorily thus, and it will be found always much better to meet the danger at once, than to be obliged to tie one vessel after another, and perhaps the various branches over and over again instead of the trunk; much less blood will be lost, the time occupied in the operation will be abridged, and the pain and suffering very much diminished; as much, in point of fact, may thus be effected, and with more safety, in five minutes, than can be done in fifty when it is improperly conducted. The utmost care must be taken to avoid the branches of the cervical nerves, and those of the portio dura of the seventh pair, by dissecting the posterior aspect of the tumor carefully, and in the direction of their course, the edge and point of the knife being constantly turned towards the part to be removed; but, in some cases of this kind, the division of part of the pes anserinus is quite unavoidable, and we shall have sometimes, in the midst of the proceeding, to decide between leaving part of the tumor, and causing a temporary paralysis of part of the face. The smallest fragment of the most simple tumor will form a nucleus for a fresh growth. The possibility of its being necessary to divide branches of nerves, and its effects, must be made fully apparent to the patient

before any attempt to remove the tumor is made. The character of a fibrous tumor in this situation is shown above. In the after treatment and dressing of the wound, the principles already laid down will be the surgeon's guide.

SEC. III.—MALIGNANT GROWTHS.

General pathological remarks.—Pursuing the subject on our present plan of classification, we now proceed to the investigation of *malignant* productions, which are very prevalent in India.

Various kinds of morbid deposits are frequently observed, which evidently depend on constitutional peculiarity—they are usually composed of irregular depositions of a very peculiar character, large, soft, and white. They are occasionally seen pervading various parts of the body, both internal, and external, either simultaneously or consecutively. The matter of this diseased texture, is frequently found in contiguous lymphatic glands, and in veins leading to the parts especially in the *encephaloid* and *melanoid* forms, and often in those of true *scirrhus* and *cancer*. They grow generally with rapidity, and on advancing to the surface of the body or the mucous membranes, frequently soften in their centres, and pass into unhealthy suppuration, or on mucous membranes into intractable ulceration.

The parts most liable to these affections are those

which are resolvable into cellular tissue, as the mammæ, testes, uterus, lungs, liver, serous and mucous membranes, the bones and their membranous envelopes.

They often pass by insensible degrees into the tubercles in young subjects, and in older ones, into cirroma or chondroma or even true scirrhus; these different textures are sometimes evidently mixed in the same morbid mass.

These depositions like the scrofulous, are often increased if not actually determined by inflammatory action, especially when preceded by debilitating causes.

From the pressure of these growths, there is generally discovered considerable adhesion to the surrounding textures, owing probably to the great tendency to similar depositions from the arteries of the neighbourhood, as is exemplified in the pelvis in scirrhus uteri. There is an exception however to be made with regard to melanoses, in which this tendency to adhesion is not so remarked, owing probably to the peculiar change in the composition of the blood in this growth.

We are sometimes unable to distinguish in their early stages these indurated or scirrhus swellings (to which some of the most vascular and sensitive parts of the body are subject,) from other tumors, especially from those of fibro-cartilaginous hardness; but the history of the affection is widely different, the latter often remaining inert for many years, whilst the scirrhus continues gradually but slowly to increase and exhibit its malignant nature by contaminating surrounding

textures, producing pain and constitutional disturbance and passing into fungoid ulceration.

Having grouped this class of tumors under the above general remarks, we now venture to treat of them in the following order.

1. *Carcinoma*.—It will be convenient to adhere to the usual division of this description of tumor into its two stages of scirrhus and cancer. The former being synonymous with carcinoma, and strictly applied to the indurated stage of the affection, the latter referring to the ulcerative process.

Description and seat, &c.—*Carcinoma* is an indurated mass of a sarcomatous or fleshy character, conveying a grating sensation and noise when cut. It is not always primary, but may supervene on adventitious formations of a simple or malignant character, but which from injury, or from sources of constitutional irritation, degenerate into this intractable form of the disease.

Though liable to pervade most textures, the mammary gland is its most ordinary seat, and next to this, the most common parts affected are the stomach, the rectum, the uterus, the lip, the tongue, the penis, the testicles and the ovaria.

When occurring in newly formed parts, it sometimes acquires for itself a slight capsule, but the boundaries of the disease are seldom clearly defined. It commences at a small globular point of stony hardness and extends as it were with radii of dense ligamentous

bands shooting into the surrounding textures. The larger bands subdivide into smaller ones and, should the diseased action supervene in other morbid growths, the character of their mass is completely altered, and this contaminating change extends ultimately to the cyst itself.

Slowness, but progressiveness, of advancement is the characteristic of this affection. The tumor is at first moveable. When the disease occupies the lymphatic glands, the cyst is at first distinct, and gradually disappears, but when this affection pervades the conglomerate glands there is no cyst whatever; the cancerous mass blends with the surrounding tissues.

The ligamentous bands are extremely numerous and assume a reticulated form, the intervening substance is of a greyish color, dense, homogeneous, and occasionally granular.

In the advanced stage, the greyish mass becomes broken down and partially absorbed, its seat being occupied by a glary or turbid fluid, a soft pulpy substance or blood, the ligamentous bands forming the parietes of these cysts, thickened and coated with a membranous lining.

All the membranous tissues become ultimately implicated, bone, muscle, ligament, skin and membrane being equally contaminated by its ravages, and even the bloodvessels and nerves,—the ligamentous bands shooting forth in every direction. The mass is now immoveable.

Such is a brief outline of the disease as it approaches towards the ulcerative stage, it will however be necessary to proceed to describe the affects when pervading the female breast, as illustrative of the disease elsewhere.

1st stage.—It commonly commences by a small indurated indolent swelling in the breast. The mamma is diminished in size from absorption of the adipose matter. It is however hardly noticed by the individual in whom it takes place until it has attained some considerable size. Such a swelling not larger generally than a walnut, may exist for two or three years without being attended by pain or inconvenience. The tumor now however becomes painful, increases in size and temperature, attended with inflammatory appearances.

2nd stage.—The attention of the surgeon is now requested, and on examination he observes an incompressible hardness, the surface of the tumor is knotted and tuberculated, and it is loose in its attachments. The superficial veins are enlarged and sometimes varicose on the effected side. The pain is of a lancinating character, occurring at intervals. The nipple is retracted often to a considerable degree. The skin becomes adherent, and appears to be drawn in and puckered about the swelling. The whole substance of the gland is now found to be adherent to the pectoral muscle beneath. The glands of the axilla become enlarged and fixed, and likewise the lymphatic glands above the clavicle, and hence there is œdematous tumefaction of

the hand and arm. The local sufferings of the patient are by this time severe, with more or less constitutional irritation. The integuments opposite the tumor will have become of a dusky livid hue, and attenuated. They now give way, the same diseased action being set up in these external textures. The ulcer expands, and a thin irritating ichor is discharged from its surface of a most offensive odour. The surrounding integuments are of a dusky red, and the margins of the ulcer are everted, thickened, and callous. Both the ulcerative and sloughing process extend to the deeper seated parts, producing an irregular jagged excavation. The pain is of a sharp, burning description.

Constitutional symptoms.—The health of the patient is now greatly impaired, the complexion is sallow and wan; there is considerable emaciation, and the alimentary organs are deranged in function. After the ulcerative stage has been established, the system is still more reduced by the discharge, accompanied with hectic fever and diarrhœa, under which the patient expires exhausted by this truly appalling and loathsome disease.

During the latter stages of the complaint, symptoms indicating disease of some internal organ, commonly of the lungs, frequently occur.

Pathological remarks.—On examination of the body we frequently find that similar cartilaginous degeneration has occurred not only in the lymphatic glands of the axillæ and neck, but, likewise in the

bronchial glands and the glands on the inner surface of the sternum, and cartilages of the ribs. Cancerous tubercles are not unfrequently found extending through the texture of the liver and under the serous membrane of the lungs. The structure of the bones is even changed. There is an absorption of the earthy matter and occasionally an unnatural fragility, and a dense scirrhus structure is found deposited in its place. Cancerous tubercle has been found in the substance of the brain.

Simple enlargement of the conglobate or conglomerate glands may be followed by malignant action. The breast may become indurated from injury or other causes, and after remaining in a chronic state for years, may at length assume a malignant action, especially at the critical time of life.

Cancer is often hereditary.

Diagnosis.—The early diagnosis of this disease may be established by its scirrhus hardness, by the lancinating pains, and partially varicose state of the veins—by the age of the patient, seldom occurring under 30 years,—before that period it is exceedingly rare. Between the ages of 40 and 50 is the most usual time of life in which it occurs.

Prognosis.—The prognosis is not only exceedingly unfavorable, but it may even be doubted whether the disposition in the constitution to this malignant growth can be eradicated. The disease generally returns either in the integuments around, in the cicatrix, or in

the absorbent glands; or similar disease supervenes in internal organs, and carries off the patient. The utmost that can be urged in favor of an early operation, is that it *occasionally* prolongs the patient's existence for some years. If, on the removal of a scirrhus tumor, cysts containing a bloody fluid should be found, the disease is said to return, of a still worse description, attended with fungous protrusion and hæmorrhage.

Treatment.—With respect to an operation, excision can only be undertaken with any prospect of success, when carcinoma is a purely *local* affection, when it is moveable, when the skin is not adherent, before the vessels are enlarged; and where there is an absence of pain or enlargement of the glands. Such principles are applicable to scirrhus generally in all parts of the body. At such a period and in such a state of the disease an operation is not only safe, but often effectual in the prolongation of life for many years.

In open *cancer* our measures can only be palliative. The constitutional sufferings admit of considerable alleviation, by the use of mild aperients, tonics and narcotics. The local measures may be antiphlogistic or sedative according to circumstances. The chlorates of soda and lime, applied in solution, greatly mitigate the foetor, which is so very distressing to the patient and attendants. Much empirical treatment has been advocated in this disease, but no specific has yet been discovered.

2. The *medullary sarcoma* or encephaloid tumor is a malignant growth, resembling, as its name implies, the substance of the brain in color and consistence. It is frequently interspersed with purulent matter mixed with grumous blood. There are sometimes ligamentous bands passing across it. It is not generally encysted. Though homogeneous at first, there is a great tendency to softening, with fluid blood and lymph diffused throughout it. The disease is readily propagated along the course of the absorbents.

The usual *seat* of the tumor is in the eyeball, mamma, ovary and testicle, but no texture is exempt from it, and it sometimes arises in simple adipose tumors when irritated.

The *symptoms* are as follows. The part is spongy and elastic to the touch, fluctuation is frequently perceived. The skin is tense, dusky, and interspersed with enlarged veins owing to obstruction in the deeper seated vessels. The enlargement is slow at first, but subsequently advances rapidly on the neighbouring parts, to which it communicates a similar morbid action. The disease is not generally attended with much pain.

Ulceration now takes place, and a fungous growth protrudes which becomes discolored, sloughs, and a bloody purulent discharge is emitted, accompanied with slight hæmorrhage. The part becomes greatly enlarged and further softened, the ulceration increases and the dull brown color of the integument spreads widely around.

The constitutional derangement is similar to that accompanying cancer, in addition to which there is excruciating pain in the direction of the nerves which in their course happen to be compressed by the morbid growth.

Coagula are found along the course of the arteries and veins to a considerable extent, the vessels are materially altered in structure, and similar softened pulpy matter is frequently found within the veins.

Diagnosis.—It may readily be distinguished from carcinoma from its softness, from its fungoid protrusion, and from its frequent effusion of blood proceeding from bloody collections on the substance of the tumor. It is far more rapid in its progress in all its stages than scirrhus and cancer.

The *prognosis* is exceedingly unfavorable, for encephaloid disease is liable to supervene in internal organs. An early removal is therefore the only hope, and which is frequently attended with success, though not invariably so.

Symptoms of medullary tumor of the eyeball.—In the incipient state of encephaloid tumor of the globe of the eye, a yellowish colored appearance is reflected from the posterior part of the eye, shining like the tapetum of a cat or sheep, at the bottom of the vitreous humour, especially when the eye is viewed laterally. It possesses often a metallie lustre as it increases and advances towards the pupil. Its surface is irregular, and ramifications of the central artery are seen running over it.

The lens is rendered opaque and protruded before the tumor as it advances towards the anterior parts of the eye. The lens then becomes absorbed and the iris and cornea pushed together into contact, the iris losing its natural color and becoming of a greyish or yellowish brown condition remains often in a dormant state for years, but when once it commences to advance outwardly it speedily occupies the whole cavity of the eye, and dilates it to thrice its natural size. The first stage of the disease is seldom attended with much pain.

In the *second* stage there is a leaden appearance of the sclerotica with severe paroxysms of pain and inflammation. The globe of the eye is often turned inwards, and the sclerotica extenuated, or the tumor in other cases may advance into contact with the cornea, matter becoming effused between its lamellæ followed by ulceration and bursting of its layers.

The sclerotica at length gives way to the increasing growth which pushes the conjunctiva before it, assuming the appearance of a dark red fungus, irregular, soft, and bleeding profusely on the slightest irritation. The eyelids become greatly distended and the tumor rests on the cheek, the integuments of which are excoriated and inflamed. It is often larger than an orange, and dilates and destroys the orbit. The lymphatic glands of the cheek and neck are enlarged.

Great constitutional irritation, restlessness and thirst prevail at this period.

The disease is most common at an early period of

life, generally in children of a serofulous habit, and appears to originate in the optic nerve, at which point this peculiar medullary growth commences.

The encephaloid tumor is very common in India, I have frequently seen it in its advanced stages. A patient from whom I removed this diseased growth, died eight months afterwards from reproduction of the disease, springing up from the optic nerve. The mass was of the consistence of brain, of a yellowish white color, with the iris, choroid and other textures of the eye extended and spread over the tumor.

The diseased state of the optic nerve frequently extends within the cranium, and often to the brain itself.

3. *Fungus hæmatodes*—Is most correctly applied to that excrecence resembling dark coagulated blood, which supervenes on other morbid growths, and more especially following medullary sarcoma, attended with profuse and often uncontrollable hæmorrhage. It is equally as malignant as cancer. *Fungus hæmatodes* is therefore strictly confined to that malignant degeneration of other tumors, attended by fungus protrusion and profuse hæmorrhage, with frequent tendency to slough. —Vide Plate V, figs. 1, 2, 3.

Local symptoms.—The tumor is soft, the coats of the vessels in the morbid growth are disorganized, hence their tendency to hæmorrhage, either spontaneously, or on the slightest injury. These vessels are numerous, the surrounding textures are completely disorganized. The muscles are of a brown color, the mass contains

numerous shining cysts holding often coagula of blood, and from which, when the coagula are removed, the hæmorrhage proceeds. Sometimes there is a large cyst, from the interior of which the blood flows.

It will readily be conceived that the *constitutional symptoms* are decidedly hectic, with great debility and emaciation from the excessive hæmorrhages, and great irritability of the stomach. The vital powers gradually become exhausted, or the patient may be cut off under one of the hæmorrhagic discharges.

The remote, and exciting *cause* of the fungus hæmatodes are altogether unknown.

Treatment.—There are no remedies which have the slightest control in checking the advancement of the complaint. The only chance consists in removal of the distempered parts at the earliest period, when the disease is entirely local, and during the absence of all enlargement of the lymphatic glands, taking particular care to remove every cyst or pouch in which the fungoid substance may be contained.

4. The *melanoid tumor*, which has received its designation from the peculiar black color of its contents (Μελας or black) resembles in consistence and color that which the contents of a decaying lycoperdon or common puff-ball would exhibit if moistened with water.

Diagnosis.—In many respects melanosis is scarcely distinguishable from the medullary sarcoma, indeed Mr. Wardrop considers it but a variety of the latter; but it differs in one essential particular, viz. its want

of organization, whilst the medullary sarcoma is remarkable for a contrary state, viz. luxuriant vascularity. It is of a soft medullary texture, and shoots forth a fungus. It generally commences in the cellular tissue, supplanting and destroying all textures which oppose its ravages, not excepting the bones. The horse and other of the lower animals are liable to the disease. Similar disease is developed in the other external and internal parts of the body. The organs most disposed to put on this morbid degeneration, are the eye and the internal viscera. In the former organ, the pain is more severe than in other situations from the great tension, and sensitiveness of the part. It commences early by impaired or destroyed vision, with a sense of fulness and pain, enlargement of the eyeball, extenuation of the sclerotica, and the peculiar opaque appearance of the pupil. It may occur likewise exterior to the eyeball in the cellular membrane of the orbit. The conjunctival vessels greatly enlarge and become tortuous with inflammation, the dark choroid being just visible towards the internal canthus. The iris is immoveable and pupil dilated and irregular; and an opaque body is discovered behind it of a dark slate color which ultimately becomes of a dirty red. A fungus at length protrudes to the complete disorganization of the globe, rupturing the sclerotica and pushing the choroid before it, which with the thickened conjunctiva form its external coverings.

Pathology.—On removal of the disease, the eyeball

and optic nerve are chiefly composed of a viscid dark brown matter resembling thick paint interspersed throughout the medullary substance.

Symptoms, local and constitutional.—Melanoid tubercles are disseminated extensively in the parenchyma of the liver, kidneys, lungs, pancreas and heart, as well as on their investing membranes and on the skin.

When appearing externally, the surface of the tumor is shining and mottled, but not generally of large size, and extends in a lateral direction, it is usually without any cyst or envelope.

There is seldom much pain, but the debility is extreme, with impediment to the vital functions, anasarca, and ultimate exhaustion.

On chemical *analysis*, the composition of melanosis approximates to that of albumen with the addition of the black pigment, in which latter carbon has been recognized.

By means of the finest injections which Breschel has endeavoured to throw into the mass, he was unable to discover any continuity of vessels between the cyst and substance it contained, or any organization in the latter, but although apparently destitute of vessels, it is probable that melanosis is not beyond the pale of vital influence, but possesses like many other tumors, an inherent power of growth, controlled by laws different from those which regulate the increase of such diseases as present an unequivocal vascularity which expresses little else than our ignorance of its proximate cause.

Treatment.—The almost invariably fatal termination where operations have been attempted, render our prognosis most unfavorable and the *methodus medendi*, excepting at a very early period (when the patient is seldom disposed to undergo a severe operation) is most discouraging.

5. *Malignant polypus* partakes much of the nature of medullary sarcoma, or is of mixed cartilaginous and medullary texture, it is attended with great pain, and has a livid bleeding surface, the hæmorrhage being often very profuse on the slightest irritation. Distortion, ulceration of the mucous membrane, and caries are often its consequences, and the case terminates fatally by constitutional irritation. Instances have occurred of this disease making its way through the cribriform plate of the æthmoid bone into the cavity of the cranium producing pressure of the brain. It is equally contaminating to the surrounding textures as the other kinds of malignant growth. As all attempts at extirpation of such disease are quite unjustifiable, it is unnecessary to describe the methods which have been recommended for that purpose.

SEC. IV.—NEUROMA.

Neuroma, the nervous or painful tubercle, was first described by W. Wood, Esq. F. R. C. S. E. It is usually situated in subcutaneous cellular tissue but not unfrequently in the intermuscular. It is of a very small

size, invested by a dense ligamentous cyst to which it intimately adheres, but occasionally the capsule is thin and cellular. It may be smooth or nodulated. Minute nervous fibrillæ can be readily traced expanding on its surface* and apparently entering its substance. Internally it is composed of numerous whitish fibres, of considerable density ramifying irregularly throughout a cartilaginous structure. Such is its general character, though subject to variety.

It is most probably nothing more than a deposition of lymph on the fibrillæ of a nervous twig, attended with inflammation, extension, and separation of the nervous filaments.

The slightest pressure causes excruciating pain. The disease is generally seated in the lower extremities, but sometimes in the upper.

Diagnosis.—Though sometimes difficult to detect by the hand, the peculiar and acute nature of the symptoms, and the pain on pressure along the course of the nerves, readily lead to an accurate diagnosis.

Similar tubercular enlargement occurs occasionally at the extremities of nerves after amputation, attended with enlargement of the neurilemmal blood vessels. These bulbous swellings are often the size of a nut or filbert and of cartilaginous hardness.

The *cause* of such tumors is inflammation and deposition of lymph on the extremities of nerves whether

* Lancet.

of the larger trunks, or the smaller fibrillæ, occasionally being brought on by including a nerve in the same ligature with a divided artery after amputation, or by pressure of the rough extremities of the bone.

An interesting case of tumor in the neurilemma of a nerve is related by M. del Greco* the second branch of the fifth pair of nerves, immediately after its passage through the foramen rotundum was changed into a fibrous mass, divided into five lobes, two of which were of the size of a peach stone. One of them reached into the orbit through the speno-maxillary fissure. The fibrous tumor was situated in the temporal fossa, between the zygoma and the great ala of the sphenoid, and the posterior surface of the upper jaw bone. The speno-palatine hole had become greatly enlarged, so as to admit the little finger, and through it the tumor had entered the nasal cavity, where it had acquired such a development, as to resemble a polypus growth. On dissecting the tumor it was found to originate in the neurilemma, and not in the substance of the nerve, which was not at all altered, except by the pressure which the enlargement of the neurilemma had necessarily exerted on it.

Numerous dissections of such tumors after amputation have demonstrated the nervous extremities implicated in the hardened cicatrix producing this highly painful swelling.

* *Lancet*.

The *treatment* consists in cutting down on the tumor and extirpating it.

SEC. V.—OSSEOUS TUMORS.

The bones like other structures are often the seat of adventitious growths either in their interior, their substance, or their external laminae. Their variety is as great as that of softer textures, but for all practical purposes they may be divided into the three following—viz: *exostosis*, *osteo-sarcoma*, and *steatoma*.

I. *Exostosis* is of analogous structure to that of the bone on which it is formed; and it is the most frequent form of disease. It may be of the density of ivory, or of a cancellated structure, the former is generally small and spherical, the latter attains a considerable size.

Simple exostosis may originally have been cartilaginous, into which osseous lamellæ have subsequently been deposited.

The tumor is perfectly indolent, unattended with pain, and producing little, or no inconvenience, excepting where its position interferes with nerves, vessels, muscles, or the immediate vicinity of a joint, the pelvis, the orbit or the interior of the skull.

The femur, the tibia, the lower jaw and humerus are the ordinary seats of the disease, though few parts of the osseous system are altogether exempt from it. Fig. 1 of Plate VII, is a very common form affecting the tibia in the vicinity of Rohilkund.

The *causes* of exostosis are obscure. They may be congenital, there may be a disposition in the body to form this deposit in various parts. External injury is occasionally an exciting cause, and from this circumstance, as well as reasoning from analogy, we may suppose inflammation to be a most frequent origin. They appear to be regulated by the same laws which govern the formation of bone generally in the body, being first cartilaginous and then osseous.

Diagnosis.—Exostosis may be readily distinguished by its density, and immobility, and by its knotty tuberculated appearance. It may either have a broad extended base, or be attached by a narrow neck.

Treatment.—Where exostosis is attended with considerable inconvenience or pain, it may be necessary to adopt measures for its removal, which may generally be accomplished without much difficulty or risk, and if completely extirpated by operation the disease will seldom return, for which purpose the instruments best adapted are a bistourie, Hey's saw, and a pair of Liston's pliers, a most valuable instrument for completing the section of the bone. In addition to the above, there should be an aneurismal needle, tenacula and ligatures, dissecting forceps, hook, and spatula to defend the soft parts from the action of the saw.

The following is a case of ivory deposit in the inferior maxilla :—

Whilst on my return from Almorah, in October 1830, a native of the hills, named K,hoondooa, requested that

his disease might be cured. He was 27 years of age, and of tolerably healthy appearance. He stated the disease to have commenced 17 years ago, with slight irritation and itching at the chin, but no pain. A swelling at the chin and inside of the mouth slowly formed, and had been increasing since he was 10 years of age. On examination, a tumor was found investing the alveolar process of the lower jaw, at the symphysis; whereby the mouth was much distorted and stretched; the lips could not be closed, some of the teeth had fallen out, and others were displaced in various directions. The disease nearly filled the cavity of the mouth, pushing the tongue backwards. The tumor was about the size of an orange, of bony hardness: and the pressure of the upper teeth, in mastication, had impressed a deep furrow across its superior part. Besides the horrible deformity of this disease, it was very irksome from causing difficulty in mastication, and swallowing, as well as imperfection of speech: and the parts in contact with it were excoriated; but there was no symptom indicating malignity.

The operation was commenced by a vertical incision from the centre of the lower lip, to the middle of the os hyoides; a horizontal incision was then carried over the chin, crossing the first section at right angles, and extending to within one inch and a half of the angle of the lower jaw on each side. The flaps were dissected back, and, with a small amputating saw, the lower jaw bone was cut through on each side, that instrument

crossing the canine tooth on the right side, and the first molar tooth on the left. With a scalpel, the disease was readily separated from the soft parts inside the the mouth. There was a free bleeding, followed by syncope. The right arteria maxillaris externa, the left labialis inferior, and the lingual artery were quickly secured; there was still an effusion of blood from the artery that runs through the canal of the jaw bone on each side. These arteries were cauterised, and the bleeding ceased. The operation lasted about 15 minutes.

The patient revived from the faintness in a few minutes, the flaps of the wound were neatly brought together, and secured in apposition by 12 sutures, assisted by adhesive plaster and compresses, with a bandage, supported by pasteboard. At the end of 24 hours, the ligatures were cut away to prevent further irritation; having so effectually done their duty in promoting union by the first intention, that after the 4th day no dressings were required. The patient was cured: and the preparation of the disease, is in the museum of the Medical and Physical Society of Calcutta now transferred to the Medical College.—See plate VII, fig. 2, 3, and 4 which formed a much larger tumor when covered by the soft parts.

II.—*Osteo-sarcoma*, may be either of a benign or malignant nature, the former consists in the development of a fleshy substance in the bony texture. The laminae of the latter become opened out by the pressure of the new formation. Some portions of the bone are

thin and diaphanous, others are increased in thickness. The periosteum is thickened and its vessels considerably enlarged.

The *symptoms* of the *malignant* commence with acute pain, and constitutional disturbance. The tumor is soft and crepitating, sometimes fluctuation can be detected, and the most severe symptoms of malignant disease become manifest—the skin is inflamed, livid and ulcerated, the veins present a curious appearance, in their blue engorged and rampant appearance; a fungus protrudes discharging a copious unhealthy sanious matter, and sometimes blood; accompanied by the most serious hectic symptoms. Like other malignant growths it imparts its contaminating influence to all surrounding textures so soon as the barrier of the external laminae of bone has given way.

Several frightful cases have presented themselves to me in Bengal in the advanced stages of the disease. There is a disposition in the constitution to the formation of the same morbid growth in different bones of the body. Indeed the osseous tissue is liable to become the seat of all the forms of malignant growth whether medullary or tubercular, and these may supervene on tumors of a less alarming description, containing gelatinous, fibrous, or any other variety of deposition.

Causes.—They are frequently excited by local irritation or injury, and appear to be the consequence of inflammation, however excited.

There is great variety in the *pathology* of these growths which may be softened, or mixed with purulent matter, blood, cartilaginous or encephaloid, with the cancelli extended into cavities containing the morbid mass, or the cancellated structure may have entirely disappeared, with the exception of a few osseous spiculæ—lastly, the contents may approximate to a steatomatous nature.

SEC. VI.—GENERAL TREATMENT OF TUMORS.

Though it is unnecessary to dwell on the usual methods of supposed efficacy in discussing tumors, since as a general rule they are seldom effectual, still they may be enumerated as follows.—The local abstraction of blood, vesicatories, diseutient liniments and frictions joined with the internal use of mercury and iodine. It is to be feared that such temporising measures have frequently permitted many tumors to advance towards malignancy, though innocent in their commencement.

Generally, but one principle of treatment is applicable to them, viz.—excision.

Previous to the extirpation of tumors of large size, or any other serious operation, I have always been in the habit of administering a very large dose of laudanum, from 80 to 100 drops for an adult.

In the extirpation of all benign tumors, it will not be necessary to remove any portion of integuments, excepting where from the great bulk of such tumors the cavity would be likely to serve as a lodgement for

purulent effusion from the redundancy of skin, which would also lie in folds and prove unfavorable to union by the first intention.

But in the removal of all malignant tumors, too much care cannot be taken to eradicate every suspicious, every discolored portion of skin, and to include even a considerable portion of substance and muscle with which these growths are surrounded, though at the hazard of having a large cicatrix. Any lymphatic gland at all indurated or enlarged should never be allowed to remain.

The horizontal will be the most favorable position for the patient to be placed in on such occasions.

The integuments should be placed well on the stretch, and the incision made straight in the long diameter of the tumors, and extending somewhat beyond their limits. The semi-elliptical form of incision is generally preferable for malignant diseases. The instruments cannot be too sharp, and the first incision should be bold through all integumental coverings, and conducted with the utmost celerity, as this is the most painful part of the operation and the most dreaded by the sufferer. The shape, and situation of the tumor will of course vary the direction of the incisions. In all practicable cases the lower or dependent incision should be made first, so as to avoid the effusion of blood over the line of the second cut, consequently enabling the operator to see what he is about. All practicable expedition consistent with the nature of the attachments should

be used in separating the mass from its lateral connections, especially taking care to detach it thoroughly on one side, first, before proceeding to the other which greatly facilitates the removal. The incisions should be always in the direction of the muscles and should commence at the point where the principal vessels enter which are thus divided at the onset, and readily secured by ligature, and hæmorrhage prevented throughout the remaining stages of the operation. If not thus secured, the same vessels may be divided several times with additional delay and needless effusion of vital fluid.

The small vessels should not in general be secured until after the removal of the tumor, excepting temporarily by the fingers of assistants, the lesser ones will be found to have contracted and to require no ligature.

After dividing the skin over any diseased lymphatic glands in the neighbourhood, and freeing them from their lateral connections, a ligature should be tightly applied around their base, and the glands then cut off—this to avoid the difficulty of searching for the artery which supplies them being so deeply situated.

The after treatment will consist in neat and careful approximation of the edge, by adhesive plaster, light bandage, and repose, and by the application of a few stitches of interrupted suture. Cold water dressings are in general to be preferred.

Treatment of encysted tumors.—Encysted tumors are best treated in the following manner. The contents

should be evacuated by an incision; this is best effected by transfixing the base of the tumor with a narrow bistoury, or if the tumor is large an elliptical portion of the sac is cut out, the cyst is then held by a double hook or a pair of dissecting forceps and carefully dissected out. Should there be any difficulty in the smaller of these tumors above the eyelids and amongst tendons to extricate the whole of the cyst, the most effectual plan to prevent re-production is, freely to apply the *potassa fusa*. In the larger of the tumors, the cyst can be dissected out entire, making an elliptical incision in the integuments for that purpose.

Operations for osteo-sarcoma.—Numerous successful operations have now been performed for the removal of the benign tumors of osteo-sarcoma, especially of the superior and inferior maxillæ, which are attended with serious deformity and suffering. As the disease affects the base of the inferior maxilla, the mode of operating has already been described when treating of exostosis. The same principles are applicable to this form of disease.

The following is the best method for the removal of sarcomatous and osteo-sarcomatous tumors originating in the antrum and *upper jaw*.

The patient being placed on a table, with his head held firm by an assistant, who should compress the carotid artery of the affected side, near its bifurcation in the neck, and if the hæmorrhage be profuse, both carotids, the operator extracts the mesial and lateral incisors, transfixes the upper lip at the mesial fossa *a*,

next the side of the nose *b*, thirdly, the side of the face *d*, from the angle of the mouth to the masseter muscle. In these incisions, the facial, and the coronary artery of the lip, are wounded, but need not be secured until the operation be finished, if an assistant can stem the bleeding by pressure. This extensive flap *c, e, i*, is now to be dissected off the cartilaginous tumour *g*, or upper maxillary bone, which is also to be divested of its soft coverings, where it is to be sawn, by inserting the bistoury first into the naris, and cutting the mucous membrane investing its floor; secondly, the periosteum on the nasal process *h*, the gum at the side of the mystachial suture *k*, the hard palate *l, l*, as in fig. 5 of Plate VII., and also that near the soft palate *m*, here carefully keeping in view the preservation of the palatine plate of the palate bone; lastly, round the tumor at the pterygoid portion *n*, and cheek bone *o*. The saw is now to be applied, first on the nasal process *h*, secondly, the malar process *o*, thirdly, at the palatine plate *m*, fourthly, along the palatine plate *l*, near the longitudinal palatine suture, fifthly, near the mystachial suture *k*, lastly, at the pterygoid portion *n*. Hey of Leeds' saw is most applicable to some of these parts, and a narrow one, about four inches long, with a firm back, to others. The cutting-pliers should now be used, and first to the nasal process, next the malar process, thirdly, the pterygoid portion, fourthly, the mystachial region, lastly, the palatine. The tumor should now be grasped with the left hand, and depressed; any

points of bone attachment must be divided with the pliers, or a cartilage-knife, and any fleshy adhesions, with the bistoury. The pterygoid muscles generally require division before the tumor can be removed, and they should be cautiously cut, for fear of injuring the soft palate. One or more branches of the internal maxillary artery may require to be secured, then the facial artery at both points, and the flap approximated, beginning first at the lip with needles, or the twisted or convoluted suture, secondly, at the nose with the interrupted suture, thirdly at the angle of the mouth with the twisted suture, and probably the interrupted combined. Teased lint is to be put in the gape of the wound, and the patient put to bed. Although I have minutely described the different points where the saw and the pliers are to be used, yet in many cases, some of the parts are so soft, that a strong bistoury can divide them; nevertheless, we ought to be aware what should be preserved. The removal of the entire diseased mass is preferable to the former method of trephining the antrum in its interior region, scooping and gouging away the tumor, and lastly, cauterizing from day to day. On the third day, or at the end of sixty hours, the needles should be withdrawn, but their twisted threads left if possible; on the fourth day, those ligatures which seem to excite inflammation; and if union of the sides of the wound have taken place, all of them ought to be removed. The wound should then be cleared of the lint, and syringed with tepid water, and have fresh lint. On the second

day, the patient should have an aperient, and when suppuration begins, have better diet.*

Operation for removal of one side of the lower jaw.—It may be necessary to remove one side of the lower jaw, should the disease be seated in the angle and ramus. In such cases the incision of the cheek is recommended to be made more upwards, over the articulation of the jaw; from this point another is made along the ramus and prolonged an inch or more beyond the angle. A third incision is made perpendicular to the first, or to the lower lip, over that part of the bone in front of which it is to be divided. The flap is turned down and the muscles and membrane of the mouth separated from the bone opposite to the last incision; after which the finger is passed through to complete the detachment. The bone is then divided at the point by the saw and pliers, the tooth in the line of the track having been extracted previously to the commencement of the operation. The cut end of the jaw is laid hold of by the left hand, and depressed, and the bistoury carried backwards along the internal surface, to effect the detachment as far as the angle. The bone is still more depressed, and the temporal muscle cut from the coronoid process. The mass is now loosened, and forced downwards and backwards on the neck; the fore part of the capsule is then cut and the bone twisted out. Separation of the remaining attachments is completed

* Lizars Practical Surgery, p. 99, Part II.

by a few rapid strokes of the knife, and the whole mass removed. Hæmorrhage is then to be permanently arrested, but instead of immediately tying every open mouth which presents itself, it is better to expose the common trunk of the internal maxillary and temporal arteries, which is easily effected, as it emerges from under the digastric muscle, and to pass a ligature beneath it, by means of an aneurismal needle. The facial, lingual, and other branches are then secured, the cavity is filled with charpie, and the incision of the soft parts are carefully closed. Union by the first intention generally takes place, but suppuration occurs from the deep wound, which becomes filled up with granulations. Tepid gargles should be used during suppuration. The unavoidable division of the branches of the portio dura occasion partial paralysis. The above methods of operating so accurately described and so successfully practiced by that excellent surgeon Mr. Liston, leaves nothing to be added. I have thought it preferable therefore to give them almost verbatim.

Authors are in the habit of including spina ventosa in the list of tumors of the bones, as well as steatoma. The former is only a purulent collection in the interior of the cancelli of bones, but as abscess of the soft parts does not fall under the description of morbid growths, neither does spina ventosa. Steatoma is merely a variety of the contents of osseous tumors, but of very rare occurrence.

In the detachments of partly cartilaginous and partly

osseous tumors in all parts of the body, it will often be requisite to remove a considerable part of bone with which they are connected, as generally implicated in the disease.

In certain tumors of this nature (epulis) growing within the mouth, of a dark purple color and possessing a more or less soft elastic feel, adhering to the adjacent bone by a broad unyielding base, the potassa fusa should be freely applied to their bases after extirpation with the knife, otherwise they are liable to be reproduced. Such tumors grow also from the antrum and cavity of the nose, and attain an enormous size, to the ultimate destruction of life. The potassa fusa produces an exfoliation of the bone and the part generally heals by granulation.

Fig. 5 and 6 of Plate VII, from Lizars, exhibit a very accurate view of the most approved methods of operating for these tumors of the superior maxilla, and for disarticulation of the lower jaw.

CHAPTER. III.

ON

LEPROSY.

SEC. I.—LEPRA TUBERCULATA VIRULENTA (ELEPHANTIASIS.)

Accurate delineations and arrangements of the cutaneous diseases of hot climates, under the designations of Elephantiasis, Lepra, Leuce, &c. must still be acknowledged as desiderata in Medical Science, as affections totally different in their nature are still confounded. The disease which I propose to designate as *lepra tuberculata virulenta** has hitherto been termed

SYNONYMES.

- * Greck ελεφας ελεφαντιασις.
 Latin elephantiasis.
 Arabic جذام joozam. داء الاسد malady of the lion.
 Persian جذام joozam and پيس
 Sanscrit कुसट kooshta, or bad condition.
 Hindec कौड khor.

Elephantiasis* partly from the partial scaly appearance of the skin, resembling the rough cuticle of the elephant; and partly from its being occasionally accompanied by that enlargement of the cellular substance of the leg commonly denominated the “Barbadoes leg” (“Bucnomia Tropica” of Mason Good.) Such indeed is the Sanscrit origin of the former गज *gaja*, an elephant, and चर्म *charmma*, *skin*; and the Arabic of the latter دال الفيل *da-ool-feel*, in Persian فيل پا *elephant's foot*. The Hindoo writers, however, more correctly limit the term *elephant's skin* to that species of the disease only where the scaly appearance is the most prominent feature of the complaint, terming these leprous diseases generally the कुसठ *kushta* or माह कुष्ठ *mahakushta* great leprosy. Now universal scaliness is by no means generally present. There is a partial scaliness always, especially about the legs and arms, and with respect to the enlargement of the leg itself, this has no necessary connection whatever with leprosy, and appears only occasionally associated with the affection among the numerous cases of *Lepra Tuberculata* which we witness

* The disease is designated by modern writers as follows.

Elephantiasis, order tubercula (Bateman).

Lépre tuberculeuse éléphantiasis, or lépre leontine (Alibert).

Eléphantiasis, class hæmatica, (Mason Good).

Eléphantiasis, (Rayer and many others).

in the East. It will presently be seen in describing the symptoms of the complaint, that its characteristics are as follows, viz. a development of partial scales accompanied with partial and ultimately complete insensibility of the cutis commencing in the extremities, with general atony of mind and body. Ulcerations form under the last joint of the metatarsal and metacarpal bones, or corrode the thick sole of the os calcis and os cuboides; and superficial ulcerations likewise occur on various parts of the skin. In the advanced stages, tubercles pervade the eyebrows, forehead, and ears &c. and the mucous membrane of the nares which are followed by corroding ulcerations and destruction of the nasal bones. I trust therefore that the designation which I have given this malignant disease, will not appear etymologically incorrect.

Symptoms.—An Individual labouring under this complaint, usually presents himself in the following condition. A general torpor seems to pervade his system, so that his sensations of pleasure and pain are considerably impaired. Instead of that excessive propensity to venery which they are generally supposed to possess, they have usually little or no inclination for such indulgence, though there are exceptions to this, where it exists in a diminished degree only. The pulse is slow, not small, but heavy, “as moving through mud.” There seems to be a sort of stagnation in the process of nutritive vitality. The bowels are generally constipated. The patient’s face is bloated.

His forehead, nose, lips and ears become swollen; his nostrils expand; his eyes appear sunk and fiery, the tone of his voice is altered to a loud and nasal sound; the skin especially of the extremities is harsh and sealy, resembling a case of ichthyosis. He is subject to profuse perspirations, especially when exposed to the sun; these are confined to the trunk, not the slightest moisture permeating the surface of the sealy extremities. He is often distressed with thirst and a sensation of internal heat. The knees are stiff, and their motions contracted. The hairs generally fall from the brows, the beard, the pubes and axillæ &c. or they are seen stunted and dried up for want of moisture. His breath is fœtid, and his perspiration rank and offensive. The blood drawn by venesection is very dark. A kind of dry gangrene pervades the fingers and toes, which are generally eaten away, and drop off at the first phalanges; these sores then generally cicatrize over, without any rete mucosum, and the next joint becomes invaded by a renewal of the ulcerative process. It is singular to observe that notwithstanding these extensive sores, they can wear hard shoes, which are seen saturated with the sanious ichor that exudes from these ulcerated surfaces. The disease progressively advances, eating through the ankles and wrists, and performing slow, but certain, and successive dismemberments, every revolving year bearing some trophy of this tardy, but gradual march of death, till at last the vitals become affected. During all this, a sleepy inertness overpowers

his mind, and "seems to benumb and almost annihilate every faculty, as well of the soul as of the body, leaving only sufficient sense and activity to crawl through the routine of existence."

In the last stages of the complaint, the flesh gapes with long sores, the mouth, nose, and brain becomes exposed to its ravages, and death at length terminates this loathsome existence. He is usually cut off by the supervention of diarrhœa. It is astonishing however to witness how long the victim lingers, from twelve to twenty years being no uncommon duration. During the greater part of this period, he has a good, and even voracious appetite, and moves about from village to village.

The *causes* of the disease are involved in considerable obscurity. "*Les alimens de mauvaise nature engendrent, a la longue, tous les symptomes de la lépre*" is the opinion of Alibert, in which Good, and Heberden, as well as Hindoo writers coincide. The analogy of the peculiar species of gangrene affecting the extremities in certain parts of France and Switzerland caused by the use of a common article of diet in these countries viz. rye in a diseased state, termed the ergot of rye (*secale cornutum*), would seem to point out diseased grain, especially rice, as a probable cause of the disease. Without hazarding any conclusive opinion upon the subject, certain it is, that the poorer classes of natives are compelled to live on very unwholesome grain, and the late Dr. Tytler has satisfactorily proved that

diseased rice, has a very detrimental influence on the constitution. The disease is very common in the valley of the D,hoon, and in Bengal, in both which provinces coarse rice constitutes the ordinary article of diet. I have particularly remarked in a vast majority of lepers that the disease has been preceded by syphilis, to which disease, especially to its secondary symptoms, it bears some resemblance. There is great reason to doubt the contagiousness of the affection. I have seen a brahmin, for instance, who labored under leprosy for four years, during which period he regularly cohabited with his wife, whom I have also observed to be a robust healthy woman. Neither she nor their child, which the man constantly nursed, had the slightest vestige of the leprosy. They appeared on the contrary remarkably strong and healthy. The patient though he had lost several of his joints, was tolerably stout, and (in every other respect) of healthy appearance. On the other hand, I have seen three members of the same family labouring under the disease, but whether from contagion, hereditary taint, or from all of them being equally exposed to similar circumstances exciting the disorder, it is difficult to determine. Again, a havildar of the governor general's body guard labouring under incipient disease in its most distinct form, imagines he caught it from eating together, and smoking out of the same hooqqah with another man of the regiment who had been invalided for a very inveterate and advanced case of leprosy. The hereditary

tendency to the disease is still doubtful, but from some cases which I have witnessed, I should be inclined to believe the disease is hereditary where it has become completely constitutional. The Hindoo writers consider it so, only in the advanced stages, when the blood, and seminal secretions are affected. They are complete contagionists, and in former times lepers used to be interred alive, immolated on the suttee, or drowned in the Ganges. Lepers in the present day, occasionally commit suicide by leaping into the Ganges; but notwithstanding this general testimony of the Hindoos as expressed in their medical writings, and legislative enactments, the lepers themselves generally deny any contagion, whilst some acknowledges an hereditary taint.

Prognosis.—Leprosy is undoubtedly susceptible of cure, in its incipient stage, and even in its advanced stages it is capable of relief, if not of actual cure. But when there is settled indigestion, pains in the head, loss of voice, redness of the eyes, generation of worms, and extensive ulceration with discharge of blood and fœtid matter a fatal termination is inevitable.

Treatment.—We are indebted to the Hindoos for almost every efficacious remedy in this disease. I shall therefore endeavour to make such selections from their numerous and somewhat incongruous compounds as seem deserving of notice; premising that almost every one of them have been tried by many able European practitioners in this country, and that their efficacy rests on the most unquestionable authority.

We have the authority of Messrs. Playfair and Robinson for the efficacy of the mudārr (*asclepias gigantea*) which since those gentlemen's able publications has been extensively employed. The disease in the incipient stage may be almost invariably cured by a persevering course of the following.

R. Protoxyde of arsenic grs. lv.

Mudarr powder oz. iv. and 80 grs.

Black pepper oz. ix.

Pound the protoxyde and black pepper in a mortar for four days at intervals. When the mixture is reduced to an impalpable powder, add the mudarr, and form into a mass by the addition of water guttation. Divide into eight hundred pills. They should be kept in a stone jar.

The mudarr is prepared as follows.

“The roots are dug from a sandy soil in the month of April and May. They are well washed in clean water till every particle of soil is removed; the moisture, is then carefully absorbed by wiping with a cloth.

Placed in the open air, they are allowed to dry so far, that the milky juice shall in some degree become inspissated, so as to flow during the subsequent operation.

The outside brown crust is then to be scraped off or separated from the woody part, and dried for use.

When reduced to a powder, it must be preserved in bottles, well corked, as it is apt to attract moisture.”

Two of the “Asiatic pills,” contain about one seventh

of a grain of the protoxide—the number of two pills per diem should not be exceeded.

Mr. Marshall of Bombay has employed nitric acid, with great success. He prescribes a drachm of acid in a pint or a pint and a half of water, the whole to be drunk daily. Of two hundred cases treated in this manner, above one third were cured, and a great portion of the remainder were greatly benefitted.*

But we must not forget the Hindoo formulæ for the cure of this formidable malady, the success of which is corroborated by Dr. Mackinnon of Tirhoot in ulcerating leprosy in its worst form: the patient treated by it having lost the greater number of his toes and fingers, completely recovered. For convenience of reference I shall give the native name of the ingredients, together with the European synonyms.

Junglee Neel. (Mimosa. Indigo.)

Sahar p'hünkā. (Galega.)

Shāh tarā (a herb growing among the Rubbee crop.)
(Fumaria parviflora.)

Very old goor (Molasses.)

Burrec hurh (terminalia chabula) of each 3 seers.

Moonghee chirayta (Gentiana chirayta) $\frac{1}{2}$ a seer.

Pound altogether and mix well, in four country pots (g,hurrés) of water. Allow to ferment for three or four days, then boil the whole till the liquor is reduced one half in quantity, or two pots full. A pint of this liquor to be taken morning and evening. To abstain

* Transactions Bombay Lit. Soc.

from all acids, and sexual communication, all kind of nourishing food to be allowed, such as meat, fish, milk &c. &c. The above remedy succeeded in curing a patient in a month, the whole of the ulcers having cicatrized.

A weak solution of sulphuric acid should be applied to the sores, or an ointment of equal parts of mudarr powder and unguentum cetacci. The warm bath should be regularly employed.

In addition to the above, the patient, in proportion to the state of his stamina and constitution, should be bled at intervals twice or thrice in the year, or more frequently, if his strength permits. He should be purged monthly with castor oil, and have an emetic every fifteen days. The treatment should be commenced by these last mentioned agents. After the cure it is also advisable to administer occasional purgatives.

The following is the diet on which Hindoo physicians place their patients whilst under the above treatment.

All kinds of game, as deer, birds, quails &c. Sush-tiká rice, or rice of sixty days growth raised during the rains in the months of August and September. Moong (*Phaseolus moong*), and urhur (*citrus cajan*). The best forms of eating them is boiled as a porridge or soup.

An admirable account of the Hindoo method of treatment is given by Professor Wilson from whom much of the above information is derived.

The vegetable articles of diet should be neem, or marking nut plant,* madder, several sorts of asclepias, and justicia. These should be dressed with oil, or ghee. And the surface is recommended to be washed with water strongly impregnated with kut,h (katechu.)

Several kinds of justicia are used in Hindoo medicine, as the J. Nasuta; S. Yuthakaperni; B. Jooipana; J. Paniculata; B. Kalapnath; maha Tita. The roots of the former, rubbed with lime juice and pepper, are said to form a useful application in ring-worm. The latter is a very powerful, and highly valued bitter: It is the basis of the famous nostrum of the coast, the drogueamere. Flora indica I. 119. and 121.

The reader will excuse my further quoting the bases of the various Hindoo compounds, which appear to me of chief importance in their treatment of leprosy.

Umlica (Emblie: myrobalan:)

Huritanki (Yellow myrobalan:)

Turifala (Myrobal:)

Kuth (Katechu)

Teora (Convolvulus terpeethum)

Umultas (Cassia fistula)

Chirayta (Gentiana Chirayta)

D,hatoora (Datura metel)

Deodar, &c. (Pinus deodar.)

* Loc. cit.

Some Fakeers are said to be able to cure the disease by administering a root procured from Nipal, which causes copious salivation, putting the patient at the same time on a regimen and prohibiting salt, and sexual intercourse.

Very minute and frequently repeated doses of mercury and antimony may be tried combined with hyoscyamus, should other measures fail.

The ioduret of arsenic would appear deserving of trial from the success which attends its employment in other diseases attended with cancerous ulceration, and the known influence of arsenic and iodine in leprous affections generally. But as the ioduret of arsenic requires a disagreeable process the following was tried—viz.

Hydriodate of potass ʒi

Arsenous acid ʒj

Rose water ʒii dissolve.

Dose about 5 to 10 minims.

It seemed to complete a cure after other remedies had apparently checked the spread of the disease, in the case of Havildar Moosahib khan of the Governor General's Body Guard.

II. *Lepa albida*, or leucopathia, essentially consists in an absorption of the rete mucosum, and may here properly be ranged among the varieties of leprous affections, with a view to correct classification. It is known to the Arabians by the name of برص Beres, and amongst the Sanskrit writers as the switrā. Leuce,

vítíligo are the names by which it was designated by the Greeks and Romans respectively. I have seen the disease gradually extend over the greater part of the body, but in general it occurs in circumscribed patches, which are quite insensible, though the disease commences by itching pain, redness and other marks of inflammation, thus differing from the insensibility of tubercular leprosy in which the loss of feeling is from the commencement. Professor Wilson* in his essay on the leprosy as known to the Hindoos, states the affection is also called by their writers *kirana*, or blotch, *varuná* or the formidable disease, and *báruna* from the deity of the waters who is of a white complexion. It is attended with itching, heat and loss of hair. Considerable irritation is produced by stimulating articles of diet, exercise, especially in the warm weather, or from any other cause exciting the circulation and determining to the surface, at which period the papillæ of the skin appear elevated and inflamed. There is no discharge or ulceration, the disease would seem to be identical with the leprosy of the Hebrews, which is characterized in the Mosaic account by whiteness of the hairs and depression of the skin. It is merely an unsightly blemish, and attended with no danger to the health. “*Vitiligo, quamvis per se nullum periculum adfert, tamen et fæda est.*”

The treatment consists in the exhibition of the as-

* Trans. Med. and Phys. Soc. Liv. chap. xii.

clepias gigantea, in combination with alterative doses of mercury and antimony, and topical stimulants. A blister applied to the white patch will be found advantageous. Stimulating the affected part with sulphurous *douches*, and with sulphur ointment and volatile liniments is also of great advantage. I have found the above produce a complete cure. The disease is considered by the natives as incurable. It is exceedingly common, and many would give a large sum of money to any medical man who would cure them.

Congenital leucopathia is by no means uncommon in India. They present all the phenomena of albinos in Europe but the irides are blue and the hair is silvery white. They have great sensibility to light, and one albino whom I met with a few years since, was affected with cataract in both eyes, of which he was happily cured by operation, but he found the midday light too strong for his vision and seldom opened his eyes perfectly, except morning and evening, at other times he might be said to *peep* through his eyelids.

CHAPTER IV.

ON

DISEASES OF THE GENERATIVE

AND

URINARY ORGANS.

 SEC. I.—ON MORBID CHANGES OF THE URINARY EXCRETION.

I. *Physiological and Pathological remarks.*—The various deposit which are liable to be formed from the urine render it desirable to introduce the subject by a brief review of the *physiology* and *pathology* of this important excretion.

When we consider that this excretion is one of the greatest emunctuaries of the body whereby various noxious products are separated from the system, we cannot be surprised at the variety of changes in its composition.

The average *specific gravity* of urine is usually estimated at about 1025—933 parts in 1,000, consisting of water and above 30 of the peculiar animal matter

termed urea. The remainder consists of the different salts which have been detected in it—viz. *phosphates* and *murates* of soda and ammonia, phosphates of lime and magnesia, sulphates of potass and soda, lactic acid, lithic acid, super-lithate of ammonia, and minute quantities of fluat of lime and ammonia. The acids predominate, and the lithic being a weak acid, is frequently deposited, and is apt to attach itself to, and lead to the decomposition of the mucus. On other occasions the phosphates predominate, or the oxalic acid, and other substances not detected in healthy urine.

The physical properties of urine are subject to great variations. Rhubarb imparts a yellow or blood red. Turpentine or rosin produce a violet color, and asparagus causes a most unpleasant odour when this substance is taken into the stomach. Various salts also when taken are speedily found in the urine. All these substances it would seem are absorbed by the veins of the stomach and intestines, so that they have a less circuitous route than is generally supposed.*

Urea, its properties and composition.—Urea is dissolved from the extract of urine by alcohol, and obtained by evaporation, partly separated from the saline matters. It has a peculiar taste and smell, and is characterized by the bulky flakey compound it forms with nitric acid. By putrefaction, or by heat of boiling water, as it exists in the urine, it is almost entirely converted into car-

* Dr. Alison. Magendie,

bonate of ammonia and it has been found to consist of

Carbon	oxygen	hydrogen	azote
19. 99	26. 66	6. 66	46. 56.
or 1	1	2	1 atoms.

containing therefore a much greater proportion of azote than any other animal principle.

The average *quantity* of urine evacuated in 24 hours is subject to a great variation. It may be estimated at about 40 ounces, the *solid matter* of which is not less than 15 drachms. The latter is much less liable to variation, the density of the urine in the healthy state being always diminished as its quantity is increased and *vice versa*.

According to the *experiments of Magendie* and other physiologists, when the kidneys have been extirpated or obstructed by disease, urea is manifest in the blood, shewing that the formation of this substance is at least so far advanced, before the blood from which it is separated, enters the kidneys. And the conjecture of Berzelius, that it is furnished by the animal matter of the serosity of the blood is rendered probable by two circumstances, *first*, that the quality of that portion of the blood (particularly its solubility both in water and alcohol) approach nearer to those of the urea, than the qualities of the albuminous parts of the blood do, and *secondly*, that after the extirpation of the kidneys, the animal matter of the serosity is first increased in quantity, and afterwards assumes the character of urea.

There is reason to believe that the animal matter of

the serosity thus apparently convertible, at least in part, into urea, is not destined for nutrition, but is the product of *absorption*, from the component parts of the animal frame, which is a necessary accompaniment of all vital action, and is intended for excretion only. This opinion is supported by the phenomena of *diabetes*, where there is ample evidence of very general absorption, viz. wasting and dryness of the body, notwithstanding the great quantity of nourishment and drink which are consumed. In diabetes the animal matter of the urine is enormously increased; and appears to retain, at least in some cases, the properties of urea for a time, and afterwards usually to assume the character of sugar from the same elements, viz. that the latter contains the same number of atoms of carbon and of oxygen as the former, with half as many atoms of hydrogen and no azote.

Urea, its poisonous effects on the nervous system.—Whatever be the source of the urea which is separated from the blood at the kidneys, the necessity of this excretion appears evident from the fact, that when the blood is unusually loaded with this secretion it acts as a poison on the nervous system, as has been uniformly observed when the kidneys have been extirpated from animals, and also, though in a less uniform manner, in the human body, when the secretion of urine had been either wholly suppressed, or more gradually and partially obstructed.*

* Alison.

The fluid found in the lateral ventricles of the brain has been found to give out a urinous smell where the kidneys have been extirpated.

The facts above stated are very important both in a pathological and practical point of view, but the laws by which chemical changes are modified in the animal economy are quite obscure, as respects the physiology of excretion, as well as secretion.

This much appears to be evident that neither the various *calculous deposits*, nor the disease termed diabetes appear at all necessarily to depend on any disease of the kidneys themselves, at least in the first instance, and therefore that they are strictly functional and not structural disorders, for they both frequently exist without traces of disease being discovered in the kidneys.

URINARY CALCULI.

It is only when deposits originally formed in the kidneys have passed into the bladder that they become the subject of surgical attention. They are exceedingly various in their composition. Some of them, the *uric acid* for instance, and the phosphates, are the natural constituents of the urinary secretion, whilst others are the results of new combinations of its elements, as the *oxalate of lime*, and the cystic oxide. The most prevalent dispositions of the system to these

deposits have been termed the *lithic* or *uric*, and the *phosphatic diatheses*.*

The "*lithic acid diathesis*," by far the most common, is characterized by the deposition of red particles, (whether amorphous or crystalline) and lithic concretions of a whitish brown, or mahogany color, in laminae or strata soluble by solution of the alkalies. If a small portion of nitric acid be added, and the whole evaporated to dryness, it assumes a beautiful carmine color.

In the "*phosphatic diathesis*" the phosphate of ammonia and magnesia predominates. It is the result of an impaired constitution rather than a primary affection. It is sometimes termed the triple phosphate, has a white chalky appearance, and is soluble in acids. It generally forms the exterior of calculi, whilst the interior is ordinarily composed of the lithic acid, or lithate of ammonia. The triple phosphate is covered with minute shining crystals; it is easily pulverized—but occasionally hard, compact, and crystallized in texture.

The "*lithate of ammonia*" is likewise by no means uncommon. It is of a clay color, composed of concentric layers and confined principally to children. It is soluble in alkalies and alkaline carbonates, and emits the odour of ammonia when treated with caustic potass.

The *vitrifying* calculus is the next most ordinary form of the complaint, so denominated from its running into

* Proust.

vitreous globules under the blowpipe. Its composition consists in phosphate of lime, in combination with phosphate of ammonia and magnesia. It much resembles the triple phosphate in color, and leaves a white dust on the fingers. It is not usually laminated, but is so sometimes, the interstices being studded with sparkling crystals of the triple phosphate. The unlaminated species is often large, spongy, and moulded to the contracted cavity of the bladder. It is easily soluble in acids, and partially in dilute muriatic acid. If the solution of oxalate of ammonia be added, a precipitate of the lime takes place, and the magnesia may be separated by the addition of pure ammonia.

Next in frequency probably is the *oxalate of lime* or mulberry calculus. It is more generally found in children than in adults, and is of great weight in proportion to its size, and has usually a number of irregular prominences on its surface, generally of a dark brown or black color.

All these varieties are subject to *alternation* especially in adults, their successive laminae being manifest on a section of the stone, and there may be sometimes, though rarely, an admixture of these ingredients. The above enumerated descriptions constitute the vast majority of urinary calculi, but there are a few other rare varieties which it is merely necessary to enumerate.

6 The bone earth, or phosphate of lime calculus.

7 The cystic oxide.

8 The carbonate of lime

- 9 The zanthic oxide.*
- 10 The fibrinous calculus.
- 11 The prostate calculus.

I have witnessed a few specimens of the cystic oxyde calculus of a yellowish white color confusedly crystallized throughout their substance. One of these had a beautiful golden metallic lustre.

The *causes* of these numerous alternations are referable to the nature of the ingesta, to the vicissitudes of temperature, to affections of the nervous system, to hysteria, and occasionally to injuries in the neighbourhood of the kidney producing proximately a deranged condition of the assimilating functions of chymification and chyfication, and altering the qualities of the blood.

An hereditary predisposition is frequently manifest in the urinary and neighbouring organs; such tendency is often curiously modified in different individuals of the same family. A parent, for instance, shall have laboured under disease of the kidney or bladder, one of the sons has been cut for the stone, and another has suffered from diseases of the rectum, the daughters have suffered from uterine affections. Indeed it has been frequently remarked that when the males of a family have been subject to urinary affections, the females have been more or less liable to disease of the generative system. Persons also suffer from different forms of the disease at different periods of life, and

* Dr. Marcet

this again alternates with diabetes. Lastly, where acids are formed in excess in the kidneys, the urine is commonly small in quantity and high colored, whereas in neutral or alkaline deposits the urine is pale and increased in quantity and the diseases, are those of irritation and debility.*

Calculous affections frequently occur in gouty subjects.

The above circumstances teach us the deep seated and constitutional nature of urinary diseases generally, their intimate connection with each other, and the important information respecting the nature of any particular disease to be derived from the nature of the urine.

The free use of acids and acescent drinks is considered to be often a cause of that derangement of the digestive organs leading to calculous deposits. The errors in diet of the natives of India, especially in children, who are permitted to devour various kinds of unwholesome rancid sweetmeats, and particularly coarse unleavened bread at all hours of the day is notorious. A late intelligent surgeon† attributed to the latter article of food the main cause of the disease in India in the same manner as it has been referred in Norfolk to the coarse dumplings in that country, where the complaint is also so common. The bodies of natives of India are generally exposed to the vicissitudes of heat and cold in a variable climate, especially in the western

* Prout.

† Burnard.

provinces (where the disease is far more prevalent than in Bengal). The vicarious office of the kidneys is consequently often called forth. In the moister and more equable climate of Bengal and where the ordinary diet consists of rice and pulse, instead of the unleavened bread or "*auta cake*," there is a marked diminution of the sufferers from this complaint.*

The intelligent mother of the European child (No. 69) mentioned that the symptoms of gravel which terminated in stone, ensued after a fit of indigestion produced by his having eaten guavas.

The great frequency of disease in children must be owing to the comparative smallness of the urethra, so that a nucleus which would be avoided with facility in the adult, would be detained in the bladder in a young subject.

An obvious explanation on the same principle suggests itself for the comparative rareness of the disease in the female.

Stricture of the urethra and enlargement of the central lobe of the prostate gland are a frequent exciting cause of the complaint, especially in adults and old subjects predisposed to the diathesis, owing, partly, to the mechanical obstacle which they present to free evacuation of the contents of the bladder, and partly, to the local irritation of these diseases, associated with that general derangement of the constitution which attends the severe forms of these affections. Calculi are sometimes

* Prout.

formed around various extraneous bodies which have accidentally found their way into the bladder as needles or pieces of bougie &c. Sir A. Cooper relates an instance of a piece of slate-pencil having formed the nucleus of a calculus of the triple phosphate which is the kind of calculus which forms under great irritation. I met with an instance where a bullet formed the nucleus of a calculus, in the case of Surgeon Pilkington H. M. 21st Fusiliers after having passed through the ischiatic notch, and which he related to me whilst witnessing the operation of lithotomy in Fort William.

The great frequency of the disease in India is now well established. The late Mr. Burnard cut about 40 patients for stone at the city of Benares. I have had occasion to operate on four patients in one day all residing in the same village or its immediate neighbourhood, and upwards of one hundred cases have occurred to myself during my abode in India. Drs. Maekinnon, Finckh, McCra, Egerton, Jackson and others, have also performed this operation with considerable success.

Of the calculi which have been *analyzed* in India three-fourths have contained a large proportion of lithic acid. The nuclei have mostly consisted of this substance, and lithate of ammonia was also generally detected. Coatings of ammoniaco-magnesian phosphate have been rather common. Phosphate of lime in combination with the triple phosphate (fusible) has been found, as well as oxalate of lime, and cystic oxide,

exhibiting therefore a similar proportion of these varieties to what has been ascertained in Europe.

It would appear that lithic acid generally in combination with ammonia, constitutes the basis of almost all the calculi, and that successive layers continue to be deposited of the same substance, until that high degree of local and constitutional irritation is produced which changes the diathesis and favors the production of the phosphate.

The lithate of ammonia deposition takes place during the intermediate stage. It may be urged, that in the case of all foreign bodies which have occasionally found an entrance into the bladder the phosphate have been deposited upon them. How is this difference accounted for, since the irritation, one would presume, is equal from a nucleus as from a foreign body? Perhaps the irritation is more sudden in the latter, whereas the constitution is more prepared in the former, and moreover has already the lithic acid diathesis pervading it in a high degree, which could not be so easily and immediately changed. The peculiar state of the assimilating functions is also to be taken into account.

Opinion of Magendie.—The theory of Magendie and others, that the lithic acid diathesis is more likely to be induced by animal food and such substances as contain a considerable quantity of azote, is not borne out by these cases, for with a very few exceptions these patients seldom or never partook of animal food. None of the Hindoos, and the few Musulmauns but seldom.

Yet on analysis almost all specimens from Hindoos contained lithic acid and lithate of ammonia. Their diet with scarcely any exception has been vegetable and farinaceous. Not but that certain articles of their food are to a certain degree azotified. The gluten of the wheat, the dâl, and especially the dhacee, but this does not invalidate, the fact of their diet being by no means of a highly azotic kind. Neither is there any foundation for attributing the supposed rarity of calculi in hot climates to the vegetable food, to which the inhabitants are habituated. The frequency has already been proved notwithstanding their vegetable diet.

Size and figure of calculi.—Calculi are liable to great variety in their size and figure. The largest I have had occasion to remove weighed about four ounces, the smallest not exceeding forty grains. Instances of very large ones are recorded, even to the extent of 44 ounces, their extraction has generally been attended with fatal results.

Calculi are usually spherical, oval, or flat. Their *number* also varies. I have sometimes removed four from the bladder of the same individual. Their surfaces are always smooth from attrition. I once extracted no less than 221 calculi of small size from the interior of the prepuce in a case of phymosis with complete closure. The calculi were lodged like a parcel of pebbles in a bag, between the glans and the prepuce.

Calculi are occasionally encysted, though fortunately such a circumstance is exceedingly rare. An interest-

ing case occurred to myself which will be described elsewhere.

The *symptoms* and means of correcting the different diatheses in order to prevent the formation of calculus or its recurrence after an operation, is the next important point for consideration.

The *lithic diathesis* exhibited in the *amorphous* sediments, is excited in dyspeptic individuals, from simple errors in diet, from unusual and unnatural exercise, from cold and damp applied to the feet, and from various debilitating causes. The deposits are of a yellow red or pink color, the lithic acid being combined with ammonia and sometimes with phosphate of soda in the former—the second consisting essentially of the lithate of ammonia or lithate of soda, tinged with the coloring matter of the urine, the last of lithate of ammonia without the yellow tint derived from the coloring matter. The crystalline sediments are nearly pure lithic acid. The symptoms attending this diathesis are, more or less, pain or uneasiness in the region of the kidney, with irritation and heat about the urethra and neck of the bladder, and frequent micturition. Children, especially the offspring of gouty and dyspeptic parents, are exceedingly liable to this affection. It frequently occurs in sedentary and luxurious individuals on the decline of life, especially in old Indians who have suffered from hepatic affections and led irregular lives. Organic disease of the right kidney is no uncommon result. European residents in India often induce a fit of the

gravel by excess or irregularity whether as to the quantity, quality, or time of receiving the ingesta. Champagne will produce it in some, claret in others, and beer or other indulgences in others. The remedial indications will be best fulfilled by attention to the primæ viæ, by the exhibition of alteratives, laxatives, tonics, and antacids of soda and potass, and in debilitated subjects by the carbonate of ammonia. These alkaline carbonates are best administered in the form of effervescing draughts with an excess of the alkali. Aesculent drinks should be avoided and exercise enjoined. Diuretics and demulcent drinks will co-operate in carrying off the deposit, and alleviating pain. Turpentine and squills are often recommended, and sometimes colchicum. Hard-waters should be particularly avoided. A healthy action of the cutaneous surface should be favored by the employment of the warm bath. In severe cases anodynes of hyoseyamus and opium should be employed.

The *phosphatic* diathesis is denoted by the pale color and usual increase of the urine. It has a great tendency, from slight causes, to deposit the lithic amorphous sediment, intermixed with the phosphates. After standing for a few hours, it is covered with an iridescent pellicle, consisting principally of the triple phosphate of magnesia and ammonia. In warm weather it becomes putrid, assumes a yellowish opaque appearance, and frequently deposits large spicular crystals of the triple phosphate, of a perfectly white shining appear-

ance.* The amorphous sediments of the phosphate sometimes contain an intermixture of the phosphate of lime, which is produced from the mucus of the inflamed internal coat of the bladder. The irritability of the system must be allayed, and in severe cases, opium will be requisite to allay irritation. When these symptoms have subsided the opium and hyoscyamus should be combined with the mineral acids, quinine, uva ursi, and other tonics. Hydro-chloric acid is of particular service. The use of oranges and lemonade should be freely allowed. The saline aperients should be preferred—plasters to the loins are of advantage, and great attention should be paid to alleviate mental anxiety.

The *oxalate of lime* diathesis is extremely rare in the form of amorphous or crystalline sediment. It is not unfrequently associated with gout, and, as lithic acid frequently is, with a tendency to cutaneous affections. Professor Brand and Drs. Marcet and Prout consider this variety as generally taking place in *individuals of sound* constitution, and rarely occurring a second time. Its treatment is similar to that adapted for the lithic acid diathesis with which it alternates. This form of disorder may be ascertained by the existence of pain in the kidneys, and other symptoms of gravel, without any appearance of gravel itself, by the urine being of a yellow tint and acid, with derangement of stomach and

* Prout's enquiry into the nature and treatment of gravel and stone.

an inflammatory diathesis either constitutional or local, especially if this be associated with suppressed gout, or cutaneous disease. Its treatment is similar to that of the lithic acid deposit with which it alternates. The muriatic acid may also be given with advantages to change the diathesis to that of lithic acid.

The other varieties of urinary calculi are very seldom exhibited in the form of amorphous sediments. Where they do occur they are treated on precisely similar principles, administering acids where the urine is alkaline, and alkaline carbonates where it is acid.

It is very important to test the various changes which the urine undergoes during the treatment, in order to enable us to regulate the doses of alkaline or acid remedies.

Renal calculi descending down the ureters are usually attended by violent pain in the course of these tubes, nausea and colicky pains, retraction of the testicle, and numbness and pain in the thighs. Instances have been known of their remaining in the pelvis of the kidney, occasioning inflammation and suppuration of that organ; but this circumstance is rare: they may likewise lodge in the ureters and obstruct the passage of urine. Venesection, cupping, and active doses of calomel and antimony should be the remedies employed, with the anodynes of hyoscyamus and opium already mentioned. On the subsidence of the paroxysm the patient should have recourse to the warm bath, warm fomentations, and to the remedies first indicated for the diathesis.

Calculus of the *bladder* may be recognized by the very acute symptoms which generally accompany it, chiefly during the evacuation of urine, which is very frequently voided, owing to the great irritation caused by the pressure of such a foreign body in contact with the mucous lining of the bladder. The pain is referred to those parts which derive their nerves from the same source as the bladder, and to the bladder itself. The pain extends along the course of the urethra to the extremity of the penis, and there is often pain in the thighs and loins. There is great variety in the degree of pain, depending upon the irritability of the patient's constitution, on the inequalities of the surface of the stone itself, its position in the bladder and its size. Sometimes old subjects scarcely experience any pain at all; in others there are considerable intervals of ease. The paroxysms of pain in some are most excruciating. The pain is most severe, on the whole of the urine having been voided, when the calculus falls in immediate contact with the neck of the bladder. There is frequently a discharge of mucus of a ropy consistence which is sometimes accompanied with blood; especially after exercise causing the stone to be agitated within the bladder, so that it is impossible for the patient to take any exercise which is attended with jolting, either in a carriage or on horseback. Another very remarkable symptom is, that the patient is constantly rubbing and pulling the glans, with the view probably of deadening the sensation of pain which is referred to that

part, the consequence of which is that the prepuce is frequently much elongated, and the whole organ often enlarged. The sufferer frequently forces his fingers up the rectum and actually tears it during his agony. There is often procidentia of the rectum. Many natives of Hindoostan sit down on the ground and press their heels with great force against the perineum during the paroxysm, and remain in that position. Others roll themselves on the ground, dance round in a circle, or lean on their elbows, or the top of their head with the pelvis raised, in order to cause the stone to fall towards the fundus of the bladder. The flow of urine is often emitted in a full stream and stops suddenly, before the whole is evacuated, owing to the calculus falling on the cervix vesicæ: it again flows on change of position. There is often a great deal of straining and bearing down. Sympathetic pains extend to the testicle, to the back of the thigh, and to the hollow of one or both feet, with a burning sensation at the soles of the feet.

Sounding. The symptoms are in many respects so pathognomonic that there can seldom be any difficulty in the diagnosis, nevertheless there are instances where some of these marked symptoms are not manifest, where the calculus is smooth, perhaps encysted and the idiosyncrasy of the individual not irritable, it therefore becomes in such instances requisite to introduce a metallic instrument, which may strike the calculus, and

communicate to the touch and to the ear a sound which immediately detects the existence of a foreign body. Again there are instances of irritability in children from gravel which simulate the stone, and which subside on the exhibition of mercurial purgatives followed by a few doses of rhubarb and magnesia. But the operation of "*sounding*" should only be resorted to on these dubious occasions; for it is extremely painful in the irritable state attending calculus, and only aggravates the sufferings and excites the alarm of the patient; circumstances which are most unfavorable, previous to the patient undergoing the necessary operation for the radical cure of the disease, who requires to be soothed both mentally and bodily, whereby he is in a much better state of preparation to undergo so serious an operation. Cases are on record where patients have died solely from the irritation and inflammation excited by sounding, and there are many more not on record. In ordinary cases, the introduction of all instruments should be reserved until the moment of operation, when every prudent surgeon must then distinctly ascertain the presence of the stone however clear the symptoms may have been, for operations have unfortunately been undertaken where no stone has been found. It is to be feared that this has arisen from the rashness and precipitancy of some surgeons desirous of operating. The instrument should have a curvature of the diameter of a smaller circle than that ordinarily given to sounds, it ought to be large and smooth. It should be a quarter

of a circle whose diameter is three inches. Where there is fluid in the bladder the calculus will be found at the lower part of the viscus which will vary according to the posture of the patient. He should be first sounded in the horizontal position reclining on his back. The instrument should be introduced completely, then partially withdrawn, the handle raised, directed laterally, and moved in various directions in search of the stone, which may be so small as to elude the point of the instrument. The projection of the inferior part of the prostate sometimes forms an obstacle by raising the point of the sound, the stone being lodged behind it and escaping detection. The pelvis may then be raised so as to cause the fundus of the bladder to become the most depending part, the stone thus shifting its position. The utmost gentleness should be used, consistent with the most minute exploring. A dexterous employment of the instrument will enable us to ascertain, with tolerable accuracy, not only the size, but also whether there be a plurality of stones, measuring the stone as it were upwards, inferiorly and laterally, with the extremity of the instrument. It is erroneous to suppose that the dimensions of calculi cannot be ascertained by examination through the rectum. The natives of India have from time immemorial been in the habit of bringing down the calculus by pressure above the pubic region, moulding as it were the hypogastrium, and causing the stone to descend towards the outlet of the pelvis; with two fingers in the rectum

they then not only seize the stone but cause it to bulge in the perineum. This I have myself witnessed.

Calculi of small dimensions can be extricated by means of Weiss's forceps. The instrument is made of different sizes, and consists of two blades. It is introduced in the usual manner, and on its reaching the stone, the blades are expanded, the convex part being pressed downwards. The blades are now permitted to close slowly, and the calculus is embraced. When the urethra is large I have known a calculus to be brought away of the size of a filbert. The presence of the calculus between the blades of the forceps is ascertained by pushing the wire through the cannula, when if it goes home the calculus is not there, and the manipulation must be repeated. The instrument must be withdrawn with great care and gentleness. It can be used both safely and successfully with care, and thus the necessity of a more serious operation will be obviated. Sir Benjamin Brodie's modification of the instrument is furnished with a silver spout, through which the urine may flow to facilitate the entrance of calculi between the blades as the water is flowing through.—Vide fig. 3 of plate. VIII.

Smaller calculi how to be got rid of.—Calculi which are not of greater diameter than that of the urethra are generally carried away through that passage by the impulse of the stream of urine. Enlargement of the prostate however will prevent this, by acting as a valve so that extremely small stones may be retained in the

bladder. Thus individuals who have long been subject to the formation of renal calculi, are, in advanced life, no longer capable of evacuating them, and they become lodged in the bladder. Sometimes these calculi can be got rid of by directing the patient to bend considerably forwards, when evacuating his urine, so as to render the anterior part of the bladder the most dependent.

Dilatation.—We may sometimes effect the extrication of calculi which are considerably larger than the urethra by dilatation. Indeed stones of extraordinary size have been got rid of in this manner. On one occasion I employed dilatation to a considerable extent by the largest sized sounds and by the calculo-fractor of L'Estrange, intending to crush the calculus. The patient suffered all the more distressing symptoms attending the presence of a stone in the bladder, which had been distinctly detected by sounding. The consequence of this dilatation was, that a stone nearly an inch in its long diameter, and the third of an inch in its shorter diameter, was brought away, and the patient escaped the necessity of an operation for its extraction from the bladder.

Dilatation, and incision in the perineum.—From the knowledge of the great dilatability which the neck of the bladder is capable of undergoing, stones which can be brought through this part and into the perineum by Weiss's forceps, though too large to be advanced further along the urethra, may be cut down upon and extracted.

Stones an inch in diameter have been got rid of in this manner by a simple operation seldom attended with serious results.

Dilatation may be accomplished in the following manner. Introduce a metallic bougie or sound of such dimensions as the urethra will admit without inducing inflammation. Let this be repeated, every day or every second day, according to circumstances, substituting each time one of larger size, thus dilating the urethra, until it is a good deal larger than its natural size. When this has been accomplished as far as practicable, let the patient drink copiously of diuretics and diluting drinks—the spirit of nitre or the compound spirit of juniper. The patient should retain his urine as long as possible, and when he can no longer resist, the calculus may be carried along the dilated passage by the stream.

Should the above method be unsuccessful we may facilitate the exit of the stone by the following plan. Introduce daily into the urethra and bladder a large bougie, and let it remain there. Let the patient drink freely of diluents, in order that the bladder may become distended, and when the patient is compelled to expel the urine, let him lean forward and suddenly withdraw the bougie. Stones which have for months lodged in the bladder may thus be extricated.

Method of using Weiss's forceps.—When it becomes necessary to extract calculi from the bladder by means of the forceps, this viscus should always contain a moderate quantity of water. Should the patient have

voided his urine, tepid water may be injected by means of a catheter. The position of the stone should first be ascertained by means of a sound. The forceps previously warmed and oiled, should then be introduced, and directed towards the calculus, and when the forceps are felt resting on it, let the blades be cautiously opened, and the Surgeon endeavour to seize it. Numbers of stones may in this manner be extracted. Sir Astley Cooper has removed as many as eight from the same individual.

Calculi in the urethra are found in various situations, causing obstruction or retention of urine. They can seldom be extracted with the forceps, because on endeavouring to bring the forceps forward, the urethra is pulled back upon the stone, the mucous membrane is often lacerated, and the stone is not moved. They are generally found in the membranous portion in the perineum opposite the scrotum, or corresponding with the situation of the frenum. The treatment consists in prescribing opium, the warm bath and fomentations. The mechanical measures consist in passing a large bougie down to the stone, taking great care not to press it against the stone lest it should be forced into the bladder. The bougie must be tied to the urethra, and the patient prohibited from voiding urine until that fluid has accumulated, and the urgency is so great that the patient can no longer resist. The bougie is then to be detached and withdrawn, and the force of the current of accumulated urine will generally be effectual

in shifting the position of the stone. Should this be ineffectual, the calculus is to be grasped with the fingers, and cut down upon by a free incision. If lodged posteriorly in the membranous portion, they are to be cut down upon by an incision on the left side of the perineum. Where the calculus is lodged opposite the serotum, there is danger of the urethra bursting and extravasation taking place into the cellular tissue—the stone must then be pushed back from its position towards the perineum, and the same efforts made towards its removal as on the former occasion. If it is found impossible to remove it, or if it returns to the point and is again impeded, a free incision must be made so that the urine may pass with greater freedom, and the calculus be taken out. Calculi opposite the frenum are to be removed by a bent probe, or the urethra may be enlarged by incision. When calculi are fixed behind strictures, and the symptoms are urgent, it will be necessary to cut down upon the stricture opposite the raphe as recommended for retention of urine arising from the latter disease, laying the parts freely open, and advancing the finger towards the neck of the bladder.

Urinary calculi beyond the dimensions of an inch in diameter when lodged in cavity of the bladder can only be removed by incision of that viscus usually termed *lithotomy*, or by the employment of various mechanical contrivances designed to reduce the calculus to fragments so as to permit of their extrication by the natural outlet, called *lithotrixy*.

Lithotomy by the lateral operation.—The primary circumstance for consideration is the state of the patient's constitution. The preparatory treatment therefore first presents itself to our notice. Individuals who have been exposed to the vicissitudes of life and privation are generally in the most favorable condition for operation; they therefore require little or no preparatory measures. A vegetable diet for a few days, the administration of a saline purgative, and attention to the peculiar diathesis already fully referred to, is all that is requisite, and will generally succeed in alleviating constitutional, and local irritation. It must always be remembered however that the presence of a foreign body is the source of irritation, and that the sooner this is removed the better. In the natives of India, their systems are habitually prepared for operation, and the little advantage derivable from preparatory treatment is more than counterbalanced by fear and suspense. They come with confidence in the superiority of European skill from hearing of our success on other sufferers, and they seek for speedy relief from agonizing pain. The patient is infinitely more pleased by immediate operation, which when set about with the least possible ceremony is not looked upon at all seriously by him. Indeed if the surgeon does not operate at once but irritates and alarms him by the use of sounds the patient almost invariably loses all confidence and leaves him. Speedy operation particularly refers to the lithic diathesis, a form of the disease the most common, and accom-

panied with very little constitutional irritation excepting that which depends on the great degree of local irritation and pain of the disorder. To children likewise these principles still more uniformly apply.

I have often observed after the frequent administration of the sulphate of magnesia, that the calculus has externally a recent and beautiful superficial crystallized coating of the triple phosphate, shewing how certain salts which are known to appear very speedily in the urine can be made to predominate and soon to change the diathesis.

Preparatory treatment and prognosis, &c.—Very different is the case often with the phosphatic diathesis, the attendant on a high degree of irritation, and sometimes connected with organic disease. It is truly distressing to witness the peculiarly severe suffering attending this form of the disease, the emaciation, the exhausted expression of countenance, the loss of appetite, and high degree of constitutional and local irritation, which together with the appearance of the urine and sediment, so readily indicate this form of the disease; indeed the looks of the patient in these severe forms are alone pathognomonic. These patients cannot be operated upon with safety until the treatment formerly detailed has been employed, so as to allay the irritation. After the employment of muriatic acid, opiates with hyoscyamus, suppositories &c., have ameliorated the severe sufferings of the patient and where the system is not completely exhausted, it is truly delightful to wit-

ness the effects of the operation. The pain attending it is a matter of comparative insignificance to such subjects, and the instantaneous cessation from all suffering acts like a charm on the late unhappy patient who generally convalesces with rapidity.

We cannot be too minute in this diathesis in enquiring after the existence of organic disease in the kidneys, or an ulcerated state of the bladder. Some unfortunate cases have presented themselves in which it would be the height of impropriety to attempt an operation. A patient presented himself at the Central Hospital in Calcutta, labouring under all the worst symptoms of irritation and the phosphatic diathesis, there was likewise purulent discharge from the bladder. I declined operating, for which he was importunate, and adopted palliative treatment. The patient died shortly afterwards, and on examination there were extensive abscesses in the kidneys contained in cyst; the right one contained two large calculi of the triple phosphate in its pelvis. There was also another found in the bladder. The parenchyma of the right kidney was completely disorganized and adhering extensively to the surrounding textures. It was thrice its natural size. Both the ureters were distended with purulent matter. The coats of the bladder were thickened and its external surface extensively ulcerated. A purulent discharge from the bladder alone is not, however, a sufficient objection to the operation, as successful cases have occurred where it existed, but it should not be

attempted until the patient has undergone a careful preparatory treatment.

In the higher ranks of society, Europeans especially, in India, and among those who have lived luxuriously, or drank freely, and in the plethoric children of Europeans in tropical climates, the preparatory treatment must be particularly attended to in this, as indeed in all capital surgical operations, but here also the introduction of sounds, to accustom the parts to the irritation of instruments, as it is termed, is to be reprobated.

Mode of operating.—Considering simplicity of instruments one of the first axioms in surgery, I generally employ nothing but a sharp scalpel, a straight staff and forceps. A dose of castor oil should be administered on the previous night, and in Europeans an enema in the morning. In natives of India the rectum is almost invariably evacuated early in the morning, and therefore this precaution is not absolutely requisite. The circumstance should be ascertained by enquiry, and the empty state of the rectum clearly known by examination per anum which also excites contraction. A large dose of laudanum, not less than 100 drops for an adult is given an hour before the operation. The existence of the calculus, by sounding, is, on all ordinary cases to be ascertained immediately previous to operation, both by the surgeon and assistants.

The necessary apparatus in addition to the instruments above mentioned, consists of a scoop, two or three sharp scalpels, a spring tenaculum, and several curved and

straight forceps of different lengths—bandage, lint, sponge, warm water, and oil. A Reed's syringe may be occasionally required should the stone be soft and break under the forceps. If the operator anticipates a very large calculus he ought also to furnish himself with a long, narrow, probe pointed knife, and forceps capable of crushing the stone, if requisite. These are to be placed on a chair to the right of the operator and covered with a towel.

The patient is placed on a firm table about two feet and a half high, with his head and shoulders well raised by pillars, and a low chair should be in readiness for the operator, whose breast should be in a line with the patient's abdomen.

The staff being introduced before the patient is secured, it is to be held steadily by an attentive assistant against the arch of the pubes, giving its handle such a degree of inclination towards the right side as shall cause the staff to be parallel with the ascending ramus of the left ischium. The hands and ankles being now secured by lithotomy garters of broad worsted tape, a bandage passed round the neck and under the hams, and the thighs separated and pelvis fixed by able assistants; the scrotum is raised by the other hand of the assistant who holds the staff, and the skin of the perineum is to be made tense by the surgeon's left thumb.

These preliminaries being completed, the *first incision* is to be effected with a very sharp double edge

scalpel, by a *free bold incision* commencing near the raphe on the left side; on a full grown man, an inch and a quarter anterior to the anus, and therefore below or posterior to the arch of the pubis, terminating midway between the ischiatic tuberosity and anus, and below the inferior margin of that outlet, penetrating through the integuments, fat, and superficial fascia of the perineum. The *second* incision immediately following divides the transverse muscle of the perineum and levator ani, in the same direction. The finger is now introduced and the groove of the staff felt for, immediately behind the bulb, which part is to be carefully avoided, as it is exposed by the first bold incision, for the artery of the bulb when wounded, sometimes pours forth alarming hæmorrhage. The point of the knife is introduced into the urethra guided on the back of the forefinger and is to be moved forwards, so as to reach the membranous portion, and is withdrawn by cutting any remaining resisting fibres downwards in the line of the former incisions. I then substitute a fresh scalpel with a blunt back, which is pushed on through the groove to the prostate gland obliquely upwards in a direction towards the umbilicus. The prostate is completely divided on withdrawing the knife, cutting downwards and outwards with a light pressure in the same line as the former incisions, the finger being still in the wound regulating the action of the knife. So soon as the resistance of the prostate gland has given way before the edge of the knife.

Scarpa and many other eminent surgeons recommend that great care should be taken not to carry the incisions through the coats of the bladder, which would endanger infiltration into the loose cellular tissue behind the neck of the bladder: in adults especially is this precaution requisite, as by too free incisions at this period of the operation, the most profuse venous hæmorrhage may be produced. If the stone is particularly large safety will depend on gradual dilatation of the neck of the bladder as the stone advances in the blades and an additional cut of any resisting muscular fibres should that appear to be requisite. Some surgeons recommend dilatation with the blunt gorget, but I have never had occasion to employ it. The extent to which this dilatation of the neck of the bladder may be accomplished is very considerable, and if the external incisions have been bold and dependent, stones of considerable magnitude can be extracted by caution and patience, which on such occasions are the greatest indications of skill.

Introduction of the forceps.—The finger is now pushed on through the opening in the bladder, and the stone generally felt: the staff is now withdrawn. As soon as the stone is felt by the forefinger of the left hand, the closed forceps is introduced, which should be long, and guided on the finger. On being insinuated into the bladder, and the finger withdrawn, the handles are raised; one blade is passed under the stone, and the other above, and the instrument closed. The finger is

again introduced to ascertain whether the stone is grasped in its smallest diameter, and to know that the coats of the bladder are not caught by the forceps, and if the stone is not in its proper diameter it may be shifted, by relaxing the hold of the forceps for that purpose. The operation is completed, by giving the forceps a quarter turn, so as to cause the short diameter of the stone to correspond with the short diameter of the wound, and *vice versa*. The stone must be drawn towards the lower angle of the wound, pressing the forceps at the same time downwards with the left hand, if that should seem necessary so as to obviate resistance from the bones in the anterior part of the pelvis. A lateral undulating motion should be given, using at the same time no violence. The parts will be found gradually to dilate, and yield to the exit of the stone. Should the stone be particularly large, and considerable resistance be offered by any muscular fibres at the lower part of the wound, I invariably give the handles of the forceps to an assistant, whilst with a scalpel guided on the left forefinger, I freely divide the opposing muscular textures, and every interposing obstacle.

In cases of enlarged prostate, it is expedient that in passing that part, the convexity of one blade of the forceps should be directed upwards, and the other downwards where by its smooth surface, it glides better over the projection, and the stone is less liable to be entangled by the tumor.

The advantage of long foreeps is, that stones of considerable size can be extricated with a more powerful lever, and a more secure grasp.

Bilateral section, and management of the large calculi.

—Should the stone be so very large as not to be extracted except by unjustifiable violence, Dupuytren's bilateral section is to be effected; for this purpose the blunt pointed bistourie may be introduced by the original wound, and the prostate freely divided on the opposite side, to the same extent as on the left, without any additional external incision. Thus almost any calculus which the bones of the pelvis are capable of admitting can be removed without laceration. The dangerous consequences of such an operation may be compared to the danger of difficult parturition, where the assistance of the obstetric is required with the forceps; being lessened by dexterity, gentleness and skill, and increased greatly by violence and laceration.

Treatment of the fragments.—Where stones are friable, the detritus and small fragments easily find their exit with the urine, through the free wound which has been made; but it will be as well to use the scoop and to inject warm water by means of Reed's syringe. The scoop is also useful for removing small calculi, using it as a lever, the lower part of the stone being held by the forefinger to facilitate the passage of the stone.

Before removing the patient, the finger should be introduced to ascertain that there are no remaining stones.

In adults an instrument called a searcher may be of use which is a straight bulbous staff.

Method of crushing the stone when large.—I have never had occasion to break the stone, for the purpose of facilitating its extraction, but such a necessity may occur from its great size. It is expedient therefore to be prepared with a suitable instrument for that purpose. It should consist of strong forceps of considerable length, with sharp wedge-shaped teeth. The handles should be strong, and fixed by a screw and nut, by the approximation of which the stone, when included within the blades is crushed.

After treatment.—The bandages are immediately removed. The wound washed with warm water, and all coagula detached—oiled lint may be introduced. The patient is to be placed on a bed, previously brought close at hand for that purpose, so that with the smallest degree possible of disturbance, he may be shifted from the operating table to it;—his shoulders should be well raised, the knees elevated by a bolster, and kept slightly apart.

Diluting drinks are to be copiously administered, half a drachm of subcarbonate of soda may be dissolved in a quart bottle of congee, from which the patient should partake whenever inclined. The more freely the urine flows the better. Great tranquility should be enjoyed, and none but light farinaceous food allowed. Some patients require to be supported who have been much exhausted by disease and irritation.

A dose of castor oil may be administered on the second day.

A large elastic gum tube is recommended by many excellent surgeons to be kept in the wound, but I have never adopted such a measure, though in cases of a very large calculus the extraction of which has been attended with any degree of tearing of the parts beyond the boundaries of the prostate, this may be useful.

In cases of inflammation of the mucous surface, either following the operation or previously existing, attended with deposition of the phosphate of lime, the administration of opium, mineral, or vegetable acids, and a decoction of the "Pareira Brava" will be indicated; and if the surface of the wound is encrusted with this white deposit stimulating applications are useful, for which purpose a lotion of the decoction of bark and tincture of myrrh may be employed. The nitric acid, or nitrate of silver in solution may be employed, with a view to promote the separation of the deposit, and the production of healthy granulation.

Observations.—There appears to me to be an important advantage resulting from the employment of the straight staff, which is that of lowering the prostate gland and the neck of the bladder towards the perineum when its handle is only slightly inclined towards the operator and consequently he has not to cut so deep as when the curved staff is employed, the gland being distinctly seen on completing the incision.

I confess my predilection for the lateral operation on the above principle, as applicable for almost the largest sized stones which are likely to occur in the practice of most surgeons, in preference to any other measures which have been advocated. The opening can be enlarged to a great extent in the same direction, indeed the bolder and freer the incisions on all occasions the better, and with the "bilateral section" we have an additional resource, and beyond this for stones of the very largest dimensions, we have the choice of the recto-vesical operation; in which the incision of the perineum is made to extend through the tunics of the rectum and sphincter ani muscle. There is less danger to the patient in these instances from division of the neck of the bladder beyond the boundaries of the prostate, owing to the freeness of the incisions and consequently the dependent opening obviating infiltration of urine. There are some extraordinary instances in which the "High operation" above the pubes may be expedient, but it can only be then justifiable where the patient is very thin, and the stone so enormous as to be inextricable by any other measure. .

The result of the above principles is the best proof of their correctness, and is therefore annexed in the notes wherein the average number of the fatal cases is 1 in 15. My last 68 cases have all been successful.

The wound must be left entirely open and permitted to granulate from the bottom. All attempts to promote union would only endanger infiltration of urine into

the cellular tissue. A small piece of oiled lint may be introduced into the wound to facilitate the current of urine: but I usually adopt nothing of the kind.

The urine generally commences to flow by the natural passage on the 8th day, sometimes in children on the fourth or fifth. In adults it may not occur till the 15th or 20th day.

Encysted calculi.—The only instances which I have met with, were two, one in which a small appendix or neck was lodged in the anterior pubic portion of the bladder where the portion broke off and ulcerated its way out, on the 4th day, and one in which it was necessary to perform what is termed, “*L’operation à deux temps*” (No. 49 and 69). Both recovered. I would strongly reprobate all forcible attempts to remove these encysted calculi when we are so unfortunate as to meet with them.

Case.—James Diggs æt. 4, a remarkably fine European child, of very fair complexion. His parents brought him to me from Delhi to Meerut when he was only three years old, but apprehending convulsions by so serious an operation, from the highly nervous irritability in a child of that tender age, I advised them to defer the operation, which they did till the following cold season, when they brought him to me at Cawnpore.

The pain attacked him in paroxysms of intense agony which would last 2 or 3 days, during which his mother feared convulsion. Intervals of complete absence of

pain would occur for a fortnight. Though a remarkably plethoric child, these attacks would in the course of 48 hours, reduce him so considerably, as greatly to alter his appearance. In the intervals, the natural resiliency and strength of his constitution almost as rapidly restored him to flesh and high color, the alternate states of acute suffering and complete ease continued for two years. Nothing further was remarkable, all the ordinary symptoms of stone were manifest in a high degree.

The operation was attended with no difficulty or delay. The stone was seized lying towards the pubic region, and with a slight resistance yielded with a snap as though some slender point had been broken off. Introducing my finger, and directing it towards the situation from whence the stone was extracted, the pubic region, I distinctly felt a point of calculus sticking in the coats of the bladder. I immediately stated to the professional men present my conviction that a neck or peduncle was encysted, being enveloped in the mucous coat, and become insinuated between the muscular fibres of the bladder, forming a cyst. I requested Dr. Lightfoot to satisfy himself on the point, which he did. I then observed that we must suspend all further interference for the present; to attempt to extricate the encysted portion would be fraught with danger, "*l'opération à deux temps*" might be requisite, but that I should be disposed rather to leave the result more to the effects of nature, anticipating that the

remaining portion might not improbably be extricated, by the natural process of ulceration, and drop into the cavity of the bladder.

The child was immediately removed from the table. The operation, and consultation on the case had occupied about four minutes. The circumstances were fully explained to the friends by the professional gentlemen present.

The result fully corroborated our expectations in this interesting case. The encysted portion dropped on the bed on the 3rd day, having been carried out by a jet of urine through the wound.

The child recovered without any unfavorable symptom, and on the 8th day I found him playing on the verandah with his brother. A few days afterwards he was able to return to Delhi, from whence his mother wrote to inform me of his arrival; adding that "he was in the most perfect, and robust health." I have recently seen the child, in passing through Delhi, he was in excellent health. It is now some years since he was operated upon.

The expediency of avoiding any attempts to complete the operation in all cases of accidental difficulty, is, I imagine fully established, and I think illustrated in the above case. There is no harm in waiting, but much hazard in attempts to overcome the difficulty. There is no operation in surgery in which more unforeseen, and consequently unavoidable, difficulties may sometimes arise than in lithotomy.

The case was a fortunate one, for the mucous coat of the bladder was decidedly injured, I felt the edges jagged at the point of fracture, cystitis was therefore more likely to have occurred which Baron Boyer states, “est la cause de la mort des trois quarts des malades, qui succombent a la suite de l’operation de la taille.” Surgeons however in the present day refer the death in most cases after lithotomy to inflammation set up in the deep seated cellular tissue round the neck of the bladder and rectum between the levator ani and deep perineal fascia, and communicating with the peritoneum.

Figure 4 of Plate VIII. represents the form and dimensions of the calculus.

“*L’operation à deux temps*,” as it has been called, can only be undertaken where the stone is found to be partially eneysted, and where it cannot be removed at the time without violence. The only occasion on which this mode of procedure occurred to me, was the following, where indeed it became a matter of necessity.

Case.—Jhoomloo, Moosulman child, aged 7 years, in a delicate and irritable state, brought on by unusually severe suffering from the stone for about two years; whereby he had been so greatly reduced that his parents for the last ten days had despaired of his life, as he had become quite helpless: they came to me for relief in Nov. 1834. The operation was undertaken as a last alternative, and at the earnest solicitation of his father. The straight staff and scalpel were the

only instruments employed, and there was no difficulty until the introduction of the forceps. The lower end of the stone was repeatedly seized, and as often escaped from the grasp of the forceps, being evidently retained, either by the firm contraction of the bladder, or by a portion of it, being eneysted. Finding all prudential efforts unavailing, and the child becoming much exhausted, I desisted; administered a full dose of tincture of opium combined with aromatic spirit of ammonia, and sent him to bed. Constant fomentations were applied. These measures had the most happy effect. The child rallied, the anodyne and soothing treatment was persevered in, and on the ensuing morning the stone was removed in the following manner. An assistant, seated on a chair, placed the patient on his lap with his back towards him, bent and raised the knees by introducing his arms under his hams, the perineum being lowered as much as possible, and the body kept in the erect position, so that the stone might gravitate as much as possible towards the lower part of the wound. Introducing my finger, I felt the calculus which was immediately seized by the forceps and withdrawn. One extremity of the stone had been lodged in a "cul de sac" of the bladder, as was evident by the form of the calculus, that extremity being of smaller diameter than the other, and having a clearly defined neck, and rough extremity where it had been compressed, apparently by the separated fibres of the muscular coat of the bladder; which satisfactorily accounts

for the impediment. I have not the slightest doubt that had I persisted in my efforts to remove the stone, the child would have expired on the table, and the expediency of procrastination on the occasion is thus exemplified. Difficulties in lithotomy do sometimes occur when least anticipated, requiring all our self-possession and deliberate reflection. There is a natural reluctance in the surgeon, on whom the credit and responsibility of the operation depend, to allow it to remain incomplete, and hence the moment of hesitation once having passed, some of our most celebrated surgeons occasionally, and young surgeons frequently, have involved themselves and patient, in the most lamentable consequences.

Arterial hæmorrhage.—Three instances of alarming hæmorrhage have occurred to myself, one of which proved fatal. Pressure should be immediately applied with the finger on the internal pudic artery, against the ramus of the ischium and if possible the vessel should be secured. This will be more practicable in a thin subject. Should that be impracticable, a large gum-elastic tube should be introduced through the wound to the bladder. Several slips of lint are to be passed along it to a sufficient depth, and retained, if requisite, by compress and bandage. Carefully avoiding the bulb of the urethra, never cutting beyond the prostate, and keeping as far as possible from the ascending ramus of the ischium, are the great preventives of hæmorrhage.

In No. 23, the patient was deluged with blood. Immediately after completing the incisions, the stone was extracted, which when accomplished, the hæmorrhage had ceased. The wound was plugged, and the internal pubic artery compressed with the finger for a long time; but, on removing the finger the hæmorrhage returned—syncope, and alarming symptoms came on. The patient sunk during the night. There was apparently an irregular distribution of the internal pudic. Post mortem dissection was not permitted.

No. 71 was another severe hæmorrhage, from a large branch given off close to the internal pudic. So near was it to the artery that Mr. Evans who assisted me, thought it was that vessel. We seized it immediately with Weiss's spring ligature forceps and secured the vessel. The other portion of the artery retracted and did not require ligature. This patient did extremely well.

A third, and similar case, occurred to a sirdar named Runjeet Sing, at Lahore, (No. 91) and which also did well, on securing the bleeding vessel.

Venous hæmorrhage.—Was very profuse in an old man who was operated on at Meerut in the presence of Dr. Bell, 11th Dragoons, and Drs. Sievright and Pine of the Cameronians. Alarming syncope and convulsions were the consequence. The latter, perhaps from the shock of the operation. The blood was evidently venous. This patient however recovered.

Fatal case in an old subject. The patient Kissoonacc

(No. 3) may be said to have been 70 in constitution, though he stated his age as 37, for he had the appearance of an old man—this is fully accounted for by his having laboured under the disease 30 years. He never properly rallied from the first, though he lingered for a month. In short he died as many old patients do, without reaction.

Curiously formed calculus.—There was an instance in which the calculus had a long appendix projecting a considerable distance into the membranous portion of the urethra, having on its upper surface a smooth groove along which the stream of urine had flowed. The sufferings of this patient were very acute.

Tetanus.—Two of my patients fell victims to this dreadful disease, they occurred about the same time, during the unhealthy season of May, when the hot winds had subsided and easterly winds prevailed. The rains had not set in, the heat at that time was suffocatingly great. This particular period is unfavorable for operating. They occurred in the early part of my career, and may prove a valuable suggestion to my younger professional brethren to avoid this season. Another child also laboured under tetanus, yet recovered. The administration of hemp now promises to be a valuable remedy in this disease.

Peritonitis.—This formidable disease is liable to occur especially in children, and requires the most energetic measures. One or two of the cases have happily recovered among my patients.

I may here allude to a mode of fomenting the abdomen adopted by the native surgeon which I have often employed after operation.

Native fomentation after lithotomy.—A square piece of cloth of a foot diameter is dipped in oil and placed on the abdomen. Small cloth bags, containing equal parts of potash and common salt, “Rey,” and “Samur” heated on an iron plate, “tubba,” and placed on the fire, are made excessively hot, and alternately applied to the oiled cloth, keeping up an incessant steaming heat. I remember reading in the *Lancet* the invariably practice of fomenting recommended after operation by Mr. Tyrrell in a clinical lecture, to which practice he appears to have been so attached, as to attribute much of his success to its employment: so also the Norwich surgeons who use bags of flannel filled with chamomile flowers, warmed before the fire and sprinkled with spirits of wine, applied in constant succession.

I have reason to think that the practice described is not unworthy of imitation on the the native principle here related. There is a condition which occasionally happens a day after the operation, simulating peritonitis, but distinguishable by the absence of all rapidity and smallness of the pulse, which remains steady. The abdomen becomes tumefied and constipated, and there is nausea. These symptoms subside under an ordinary dose of castor oil and fomentations. One or two paroxysms of fever in children without any other unfavorable symptom,

need not alarm the young practitioners, as they soon subside under the above treatment.

Wound of the rectum.—Where the incisions are very free, as they ought to be, the coats of the rectum are sometimes perceived at the moment of completing the incision bulging in the wound, especially if there should be tenesmus at the time, which is not uncommon. The rectum at such a period often forms a bladder as it were, distended with flatus, and in imminent danger of the knife: of course the surgeon readily discovers the circumstance, and defends the intestine with the forefinger of his left hand, but occasionally not until the knife has inflicted a slight wound. Serious ill consequences from it, however, are not to be apprehended. The accident has occurred to myself. All that is requisite is, to avoid all articles of diet which tend to form feculent matter; restricting the patient to fluids for 5 or 6 days. Where there is any vigor in the constitution, granulations spring up, filling the wound from the bottom, and when the evacuations are passed they generally take their natural course, and a fistulous or sinuous opening is seldom the consequence.

Fatal results after the operation, are caused either by peritonitis, by infiltration into, or suppuration of the cellular tissue around the neck of the bladder by ulceration of the prostate, existing before the operation, by chronic inflammation of the bladder and organic disease,

by very large calculi, and by hæmorrhage. All these circumstances have been alluded to in the foregoing pages. The symptoms, however, of infiltration and suppuration are peculiar, and I now proceed to consider them under the following head.

On the subject of carrying the incision beyond the base of the prostate together with the orifice of the bladder, much discrepancy of opinion still exists. Scarpa has recently promulgated the opinion that to extend the incision even to the extremity of the base of the prostate is fraught with danger, and that "*the event would necessarily be an effusion of urine into the cellular membrane, between the rectum and bladder, and consequently suppuration, gangrene, fistulæ, and other serious evils.*" The names of Le Cat, Callisen, Dupuytren, Brodie, Stanley, Liston, and others, are associated with this opinion. On the other hand some of our most successful lithotomists, especially Martineau, and Klein, who seldom lost a patient, invariably incised the entire left side of the prostate even to its base, and hesitated not to make the freest possible opening wherever there was the slightest degree of opposition to the exit of stone. My own experience certainly coincides with that of Martineau and Klein, and the highest possible authority, viz. that of Sir Astley Cooper and Mr. Samuel Cooper who regard the effusion of urine from a free incision, as much less than is apprehended by the several practitioners whose opinions have been already cited. As Mr. Cooper judiciously observes, "the point can only be settled by

a fair comparison of the results of operations conducted on the two opposite principles; by ascertaining the causes of death in a fair number of instances; and in particular by observing in the various dissections the real extent of the wound; for there is reason to suspect, that some persons who advocate a small internal incision, in truth often make a free one." It is with a view to such a comparison, that I affix a statistic record of my own cases, to which I refer the reader, and it certainly has appeared to me that the very result so much apprehended from a free incision of the neck of the bladder seems to have followed in most of my unsuccessful cases from a *want* of a sufficiently free incision, whereas my unhesitatingly cutting all opposing textures has, especially in my last 68 operations been followed with the happiest results. Indeed I have almost felt conscious whenever a case has terminated unfavorably, or the recovery has been slow, that my internal incisions had not been sufficiently bold, and that the operation had been protracted thereby. Nevertheless Sir Benjamin Brodie, for whose observations on this, and every branch of surgery, the highest opinion ought to be held, declares, that all he has been able to observe, for many years past has confirmed him in the opinion, of an incision of the prostate, extending into the loose cellular texture surrounding the neck of the bladder being replete with "danger, and as this inflammation and sloughing of the cellular membrane producing secondary inflammation of the adjoining portion of the peritoneum," may occur

to others and perhaps to myself, I deem it right to quote Sir B. Brodie's description of the symptoms, and his mode of practice when such symptoms occur. He observes, "that the symptoms, which arise in these cases, are not well-marked in the first instance. There is some heat of skin, and generally an absence of perspiration; there is usually an abundant flow of urine through the wound; the pulse, as to frequency, is somewhat above the natural standard; and the patient, although free from suffering, has no disposition to sleep. This state of things continues for twenty-four, or even forty-eight hours after the operation; then the more characteristic and alarming symptoms shew themselves; the pulse becomes more frequent, rising to 90, 100, or even to 140 in a minute; the heat of skin becomes still greater; the countenance anxious.

Afterwards as you count the pulse, you find every now and then a pulse weaker than the rest; and at last there are complete intermissions. At first, the intermissions are not more than one or two in a minute; by degrees they become more frequent, until they occur every third or fourth beat. There is an occasional hiccough; the patient complains of some degree of tenderness in the lower part of the abdomen, especially in the left groin; the belly becomes tympanitic, that is, the stomach and intestines are filled with air; the distention of the belly increases; the hiccoughs are more frequent; the pulse continues to intermit, becomes weak and fluttering. In some instances the

patient retains his understanding even to the last ; while in others he falls into a state of low delirium previous to death. Occasionally, in the progress of such a case, the patient has a severe rigor, and sometimes he complains of pain in the loins. Where these symptoms begin at an early period, he may die within forty-eight hours from the time of the operation ; but in other cases, death may not take place for four or five days, or even for a week. On dissection, you find the cellular membrane round the neck of the bladder, and between the prostate and the rectum, bearing marks of inflammation, infiltrated with lymph and serum, and to a greater or less extent converted into slough. If death has taken place at an early period, the intestines are found distended with air, and there is a very slight effusion of serum in that part of the peritoneum which descends into the pelvis. But if the patient has laboured under these symptoms for many days before he dies, the peritoneum, where it is reflected from the bladder to the rectum, is seen of a darker color than natural, and encrusted with lymph ; and at a still later period there is the appearance of inflammation, to a greater or less extent, throughout the peritoneum generally. But the peritoneal inflammation is evidently not the primary disease : it is the inflammation and sloughing of the cellular membrane of the pelvis which has induced inflammation of the adjoining portion of the membrane. Something also is to be attributed to the tympanitic distention of the intestines, which if continued for a

considerable time, is always liable to be attended with tenderness of the abdomen, and some degree of peritoneal inflammation.

“It is important not to fall into error regarding the cases described above, as cases of simple peritoneal inflammation; for the remedies which would be useful in the latter case are injurious here. The abstraction of blood, even the operation of an active purgative, will cause the patient to sink more rapidly, tending only to hasten his death. The proper system to be pursued is the opposite to that of depletion. The patient should take such nutriment as his stomach is capable of digesting. The bowels may be kept open by injections, or by the exhibition of some very gentle purgative, and ammonia, wine, and brandy, are to be administered, when the state of the general system indicates that stimulants are necessary.

“Under this kind of general treatment I have certainly, in more than one instance, known children to recover, who were affected in the manner which I have described. In one of the cases to which I allude, an abscess formed in the neighbourhood of the neck of the bladder, which burst into the wound, and then the symptoms subsided. In the other a slough separated into the rectum, and a fistulous communication remained afterwards between the bowel and the neck of the bladder; but it was of a small size, and productive of no serious inconvenience. In adults the chance of recovery is, at any rate, much smaller than

in children." "Let us consider," Sir B. Brodie goes on to observe, "how it is that the dangerous symptoms arise. There is suppuration and sloughing of the cellular membrane round the neck of the bladder, and the constitution is disturbed, as it is in the case of a carbuncle; or, what is still more analogous, as it is in those cases in which there is sloughing of the cellular membrane of the scrotum, in consequence of the effusion of urine arising from the rupture of the urethra behind a stricture. In these cases, what is the practice recommended? Do we not divide the soft parts freely over the sloughing cellular membrane? and the operation is productive of the most signal benefit. There is also a practice corresponding to that under consideration, to which we may resort, viz. by laying the sloughing abscess open into the rectum. The following is the result of an experiment made according to this practice. In September, 1825, I operated on a patient, a man between fifty and sixty years of age labouring under stone in the bladder, in St. George's Hospital. The stone was extracted without the smallest difficulty. But I performed the operation with what is called Blizard's lithotomy knife. This is a long, narrow, straight, probe-pointed, bistourie and you must cut with it laterally, in order that you may divide the prostate, so that it is difficult to determine the exact extent of the incision. Immediately after the operation, I had some misgivings, and was led to fear that I had made the incision to such an ex-

tent as to penetrate beyond the boundaries of the prostate. At first, indeed, the patient appeared to be going on as well as possible; but in about forty-eight hours after the operation, some unfavorable symptoms began to shew themselves. On the third day after the operation, the countenance was anxious, the skin hot, the pulse occasionally intermitted. On the following day, the fourth, the pulse intermitted once in fifteen beats; skin, hot and dry, and the abdomen began to be tense and swollen. I could not doubt that those symptoms existed which I had known to be the precursors of death in some other cases. Under these circumstances, with the concurrence of my colleagues, I performed the operation which I am about to describe. I introduced the forefinger of the left hand into the rectum. I then passed a probe-pointed curved bistourie into the wound, and quite to its farthest extremity on the left side of the neck of the bladder. The probe-point having been felt through the tunics of the rectum, I pushed it carefully through them, and, drawing it downwards, divided the lower part of the rectum, sphincter and all. Thus the wound and the rectum were laid into each other. Little, or no hæmorrhage followed, the relief was immediate. In five minutes after the operation the intermissions of the pulse had diminished from one in fifteen to one in fifty beats. In an hour it did not intermit at all. During the two following days he appeared quite well; the pulse was regular between 70 and 80 in a minute. On the next

day there was a slight recurrence of the intermissions of the pulse, but it subsided on the exhibition of some brandy and ammonia. After this there was a progressive amendment; the pulse however, continued to beat between 80 and 90 in a minute for the two or three following weeks. After about a month, the wound in the rectum began to contract, and the urine to flow by the natural passage; and in another fortnight the patient went into the country, nearly the whole of the urine at this time flowing by the urethra."

LITHOTRITY.

Lithotrity.—Every contrivance which ingenuity and mechanical science could suggest has been directed towards the crushing stones within the cavity of the bladder. Their application has been greatly facilitated from the knowledge of the great dilatability of the urethra and the facility with which straight instruments can be introduced. The advantages of such a discovery are great, and every Surgeon should render himself thoroughly acquainted with all the manipulations of these instruments. Unfortunately lithotrity is only adapted to a few cases. The advantages of lithotrity are, that it is less formidable to the patient especially in civilized life, and that many individuals will be induced to submit to it at an early period who would not have submitted to the operation of lithotomy. But

such arguments are not applicable to the natives of India. The feeling of fear is inconsiderable in uncivilized life. They would rather get rid of a painful disease at once, than undergo any tedious though less dangerous process, and therefore in offering a review of the merits of lithotrity its application cannot be available as respects them. The longer process of lithotrity wearies them, and exhausts their patience, so that before the complete reduction of the stone can be accomplished, they intreat for the more expeditious mode of cutting.

I am not aware that any approximation to such a favorable result has yet been attained by those who practice lithotrity exclusively, even amongst the most experienced, and ingenious, as that which has of late attended the operation of lithotomy on the natives of India. With such results, I could scarcely wish to change, especially when so discouraged by the patients themselves. In two of the cases where the *calculo-fractor* had been employed, the calculi seized and broken, and large portions of detritus carried away, the patients refused further procedure, and left me, though labouring under irritation. In a case where the perforator, or "lithotriteur à trois branches" of Civiale was employed by me, the calculus was pierced, but like the others, the patient's entreaties for lithotomy were urgent, and the stone completely perforated through, was therefore removed by the process solicited. These cases have been published in the "Transactions of the Medical and Physical Society."

Lithotrity is attended with no risk of hæmorrhage, it requires under favorable circumstances little or no confinement, but the operation is not free from danger by any means. To argue from the failures of the unskilful would not be fair, unfortunate accidents are not more frequent in lithotrity than in lithotomy under unskilful hands, such objections therefore may be set aside. But drawing our inferences from the first rate lithotriters of the day, we may safely enumerate the following disadvantages. A cure is not obtained at once, several "scéances" are required, and numerous fragments are left sharp and irritating to the mucous coats of the bladder, sometimes inducing inflammation, and the most serious local and constitutional suffering. The disease is more liable to recur, for the smallest of these fragments may become the nucleus of a subsequent concretion. Such a liability is particularly incurred by an enlarged prostate from which the individual is incapable of completely evacuating the bladder. Upon the whole the quantum of suffering must generally be considered greater in lithotrity. Where the disease is complicated with disease of the bladder or kidneys, or ulcerated prostate, the danger is equally great, perhaps in lithotomy as in lithotrity. It is altogether inapplicable to children whose constitutions are irritable, whose calculi are generally very dense, and whose organs would not possibly admit of the necessary instruments being introduced—and three-fourths of the patients who present themselves with the stone are children.

Lithotritry can only be applied to stones of small size, not more than an inch and a half in diameter. They should be brittle, and the mucous coat of the bladder and prostate gland must be healthy, though probably much may be accomplished in producing a quiescent state of these organs, and allaying irritability by preparatory treatment. The viscus must be capable of containing a moderate quantity of water to admit the necessary movements of the instruments, without bruising its walls, and the operator should instantly desist, when irritation or pain is produced.

It is evident from the above, even under the present improved state of the instruments, that lithotritry cannot supersede lithotomy. That it is only applicable to a small proportion of cases.

The *comparison* between the two operations can scarcely be fair unless by comparing the results of the two, where practised on cases of similar description. Lithotomy, however, is employed on almost all cases, excepting where there is such a complication of disease as to render any operation unjustifiable, whereas skilful lithotritists hitherto have been extremely cautious, and very properly so, in the selection of their cases.

Great praise is due to Continental Surgeons for the discovery, and when judiciously selected, the operation is altogether to be preferred, in civilized life, and should be practised by the regular Surgeon, and not left to the hands of a few exclusively. Were I in England, I should not hesitate to practice lithotritry on all favor-

able cases. At the same time it must be acknowledged, that the lateral operation in good hands, is neither a very hazardous or painful operation.

I prefer the calculo-fractor to the instruments of Civiale, or to the percuteur of Baron Heurteloup,—vide Plate IX. figs. 1 and 2 taken from Messrs. Bagg's illustrations for Liston's Operative Surgery.

SEC. 1.—CALCULUS IN THE FEMALE.

Calculus in the female.—The size, shortness, and dilatability of the female urethra, not only render the expulsion of calculi a matter of comparative facility, but, in the instances of large calculi enable us by mechanical dilatation to remove stones of very considerable dimensions. When we consider that calculi weighing four ounces have gradually obtained an exit by the dilatation of the natural parts, we need not be surprized that Surgeons should have availed themselves of this experience. Gradual dilatation is therefore the best means of extracting calculi from females should the stone be small. The dilatation should be accomplished at one sitting, if otherwise, we must endeavour to increase the dilatation from day to day, until the greatest degree of distension is produced. Contusion, and laceration are the causes of distressing incontinence which has followed too hasty measures.

The *symptoms* are not dissimilar to those accompanying the disease in males. There is incontinence of

urine, prolapsus, excoiation, bloody urine, and considerable suffering.

Treatment.—The following is a description of the instruments and method for extracting urinary calculi from the female. The dilator consists of two or three, blades made so as to separate in a parallel direction by means of a screw. Their separation is gradually increased until the urethra be capable of admitting the finger, which is introduced to ascertain the dimensions of the stone, and the dilatation increased if requisite. When dilated to a sufficient extent, forceps are introduced, and extraction effected in a direction downwards, and backwards.

Mr. Weiss has invented a very useful instrument for breaking stones which are too large to admit of extraction through the female urethra.

It has been proposed to accomplish the extraction of the larger sized calculi by incision in various directions. Lithotomy is very easily accomplished in the female, but incontinence of urine frequently follows its adoption, as well as that of dilatation. The best method is by means of a straight staff and scalpel. The staff is introduced through the meatus urinarius. The groove is turned obliquely downwards and outwards, parallel with the ramus of the left os-pubis. The scalpel conducted along the groove penetrates to the bladder, and is made to divide the neck of that organ and the meatus in the direction of the groove backwards and downwards.

The bladder can be cut without interfering with the urethra, by an incision of the fore and lateral part of its neck, but as I have succeeded with dilatation whenever I have had occasion to remove the stone from the female bladder, I shall content myself with giving an extract from the best authorities on the subject. A staff is introduced into the urethra and depressed towards the vagina. An incision is then made by the side of the crus cletoridis, and through this the finger reaches the neck of the bladder, more by dilatation than by the additional use of the knife. It is requisite to retain an elastic tube in the opening in order to prevent infiltration.

In cases of incontinence of urine after incision, it has been recommended to employ the actual cautery to promote contraction of the opening.

SEC. II.—DISORDERS ORIGINATING IN THE MUCOUS MEMBRANE OF THE URINARY PASSAGES.

I. *Gonorrhœa*.—It might appear superfluous to devote any portion of these pages to the consideration of an affection so universally known, were it not for the purpose of introducing a more simple and convenient mode of treatment than that ordinarily adopted for this disease, the management of which is acknow-

ledged to be often difficult and tedious. Gonorrhœa is intimately connected as cause and effect with many of the morbid changes of the system of organs under consideration, and could not therefore be well excluded in treating systematically on these disorders.

Pathological remarks.—When we consider the activity of the vital actions in the mucous membrane of the urethra, its frequent excitement by changes in the nervous system, and the numerous capillary blood vessels and absorbents with which it is supplied, we are readily able to appreciate the severe irritation and pain attending inflammation excited by the specific contagion of gonorrhœa.

The mucous lining of the urethra is beset with numerous lacunæ, of various sizes, especially towards the septum penis, one or two of which in particular, next the glans, are often considerably larger than the rest. They run longitudinally from behind, forwards, and perforate the urethra by orifices large enough to admit a bristle. They discharge a bland fluid for the defence of the urethra. The urethra easily sympathizes with the external surface of the stomach and intestines especially the lower, acrid matters for example applied to the surface of the skin occasion irritating effects along the whole course of the urinary mucous linings and stimulating substances received into the stomach produce similar irritating effects.

Distinction.—It will be convenient to distinguish this disease into its two varieties, the *gonorrhœa viru-*

lenta and the *gonorrhœa benigna*, the former being strictly applied to the specific disease produced by the application of the poisonous matter, (Gonorrhœa by immediate contact,) the latter being produced by any of those causes capable of exciting inflammation of the urethra, whether from the irritation of stricture, from the irritating and acrimonious qualities of the urine, from the arthritic diathesis, or from excessive sexual intercourse, especially of an impure kind.

Seat.—*Gonorrhœa virulenta* is confined to that portion of the canal extending to about three inches from its orifice. Gonorrhœa usually supervenes from four to twenty days after exposure to the infectious cause, but it may occur earlier or later, according to the irritability of the individual, and virulence of the matter applied.

Symptoms.—The first symptom which is observed is a swelling and redness of the lips of the urethra accompanied with itching and irritation at that point, which latter first attracts the attention of the patient. On examination a slight purulent secretion will be observed to have collected at the mouth of the urethra, and the organ will appear somewhat enlarged. The evacuation of urine, which is frequent, is attended with a sensation of scalding, which soon becomes exceedingly painful. The inflammation and swelling contract the calibre of the passage, and cause the urine to be emitted in a small and scattered stream. The pain during erection is extremely severe.

A very distressing and painful symptom is liable in severe cases to occur, especially during the night, termed *chordec*. The inflamed membrane is stretched and great pain is experienced along the course of the urethra. The cause of this is the inflammation having taken place in one or more of the large *lacunæ* extending to the cellular tissue and substance of the *corpus spongiosum urethræ*, or the *corpus cavernosum*, and according as one or the other of these structures is affected, so is the penis bent down or towards one side, especially during erection: the *corpus spongiosum urethræ*, when that is inflamed, not admitting of so complete a distension as the *corpora cavernosa*, the penis is curved downwards. Permanent deformity is occasionally the consequence of this effusion of lymph, obliterating, the cells of the *corpus spongiosum*, and causing imperfect erection.

The discharge is puriform, of a green color, and often very profuse in quantity, especially in irritable subjects. As the disease abates it diminishes in quantity and becomes thicker in consistence, streaked or ropy. It is latterly colourless. After the subsidence of acute gonorrhœal inflammation, abscesses of the *lacunæ* of the urethra are apt to form, indicated by small knotty swellings along the under surface of the urethra. They sometimes break externally. The *lacuna magna*, opposite the *frænum* is the most frequent seat. Suppuration of the *lacunæ* opposite the scrotum is attended with very severe symptoms, and repeated abscesses.

Enlargement of the lymphatics of the penis is not uncommon in severe or neglected cases, attended with swelling of the inguinal glands; an indurated chord is felt along the dorsum of the penis which may be followed by inflammation, and abscess of the tendinous sheath.

Abscess of the perineum is liable to ensue from neglect, and the extension of the inflammation along the canal, the inflammatory action extending from the urethra to the cellular texture exterior to it. There are pain and fever, the part is hard, and the patient is unable to sit. Absorption of intervening textures takes place, and fluctuation is at last felt. Should the matter, however, form deeply behind the bulb and in the cellular texture beneath the perineal fascia, or in the situation of Cowper's glands, the abscess may not so readily point externally.

Causes.—Gonorrhœa is induced by the application of morbid matter to the extremity of the mucous membrane of the urethra. There is, however, much to be attributed to idiosyncrasy and irritability, many individuals preserving an entire immunity though repeatedly exposed to contagion, while others are continually suffering from the disease. It has been well ascertained that females not labouring under virulent gonorrhœa themselves, are yet capable of imparting the disease, especially to irritable habits. These females though formerly unsuspected of any taint, by the medical police in Paris, have again been minutely

examined by means of the speculum, where abscesses, of the lacunæ and follicles of the upper part of the vagina about the neck of the uterus have been discovered, to which the infection has been traced.

Treatment.—If the Surgeon is consulted within the first day or two after contagion, before the development of the disease, it may in such cases be altogether prevented. For this purpose a bougie should be introduced three or four times a day to the extent of two or three inches only, plentifully smeared with balsam of copaiba. This may be almost considered as a specific when thus locally applied in time to the part before any symptoms of the disease have manifested themselves, further than a slight irritation and *suspicion* of infection having taken place. The patient may at the same time take the cubebs in doses of a drachm, three times a day, or in essence which is more palatable, observing rest, and a temperate diet, with demulcent drinks, and refraining from every kind of stimulant, especially beer, and attending to cleanliness. I wish it particularly to be understood that I only allude here to the treatment of the premonitory symptoms, or suspected contagion.

Should the disease have developed itself, the following treatment should be adopted—viz. leeches along the whole of the urethral aspect from the frænum to the anus, fomentations, the warm hip bath, general bath, rest, low diet, diuretic diluents, mucilaginous drinks, saline aperients, and the mixture of aqua potassæ.

Should the inflammation have extended to the pe-

rineum it will be necessary to apply leeches to that part followed by hot fomentations, antimonials, occasional saline aperients, and diluents. So soon as the acute symptoms have subsided and in *benign* cases *generally*, the copaiba should be again exhibited in doses of a drachm, or two drachms administered at bed time. It may be given in a more agreeable form made in boluses or capsules of rice-paper, and the cubebs may be given twice a day in the following formula.

R. Pulv: cubeb ʒj.

Gum: acaciæ. ʒj.

Potassæ nitratis. grs. iij.

The advantage of the anointed bougie.—The anointed Bougie should be also employed, and is of infinitely more value when locally applied to the seat of the disease than when the balsam reaches the passage by the circuitous route usually adopted, and only being applied from time to time when the patient voids his urine.

Mucilaginous drinks cannot be too freely given with a small quantity of the spiritus ætheris nitrici; applying the unguentum hydrargyri c. camphore on a rag wrapped round the penis will often prevent chordee.

The following is a valuable remedy in chordee.

R. Opii. gr. iij.

Extracti hyoscyam. gr. xv.—M. fiat suppositorium.

Friction with camphorated mercurial ointment will expedite the absorption of extravasated lymph which remains after the subsidence of active inflammation.

Where the bladder becomes affected, an anodyne suppository of opium and hyoscyamus is of the utmost advantage, together with which leeches may be applied to the perineum and pubis and the warm bath and fomentations prescribed. Bleeding from the arm may, in plethoric subjects, be required.

The member should be supported by a suspensory bandage, and the remedies ought to be continued in diminished quantity for some days after the disappearance of all discharge, the patient continuing to abstain from stimulating diet and excesses of all kinds.

Stimulant and astringent injections have been considered injurious, as liable to irritate and extend the inflammation along the whole course of the canal, thus superinducing cystitis or the disease absurdly termed hernia humoralis, and leading also ultimately to stricture. They may, however, be often very advantageously employed, by taking the precaution always to *compress the urethra* three inches beyond the orifice, so as to prevent the injection reaching beyond that point. The patient can be particularly instructed to attend to this, when he may then safely inject the sulphates of copper, zinc, or iron commencing with the proportion of two grains to the ounce of water, and gradually increasing the strength of the injection. No force should be used. The patient must be directed to void his urine previously, and the injection may be repeated four or five times a day, and he must live abstemiously.

The internal administration of cantharides has been

recommended when a *gleety* discharge remains, and should the passage be contracted, the occasional introduction of a full sized bougie will be requisite, with cold bathing both local and general, carefully avoiding all stimulating diet, otherwise inflammation of the testes would be endangered.

Treatment of the consequences of gonorrhœa.—It is scarcely necessary to add, that where inflammation of the bladder or swelled testicle occurs consequent on a sudden suppression of the discharge, its return should be favored by leeches to the perineum, fomentations and the warm bath.

Abscesses of the lacunæ should be repeatedly poulticed until the matter is discharged, and where fluctuation can be distinguished, an early opening should be practised. Abscesses of the lacunæ opposite the scrotum must be treated with very free incisions on the middle of the septum.

Abscesses in perineo require local antiphlogistic measures, fomentations and laxatives, and a catheter of elastic gum or silver should be kept in the bladder, properly secured. Early and free incisions should be made the moment that fluctuation is felt, to prevent the most serious results of infiltration, and sloughing of the cellular membrane. The health, which is generally much broken down, must be supported by tonics, alteratives, nutritious diet and pure air.

Extravasation of urine will be exceedingly rare under proper treatment. In neglected cases where it has

occurred, early and free incisions towards the nates should be immediately made.

STRICTURE OF THE URETHRA.

Definition.—*Stricture of the Urethra* may be defined a contraction of the calibre of the canal, occasioned by a change of structure, consequent on an effusion of lymph, produced by inflammation or from the cicatrization of an ulcer. This extravasation of lymph takes place between the mucous membrane of the urethra and the corpus spongiosum. Spasmodic stricture cannot with propriety be considered as a disease, although the urethra is capable of temporary spasmodic contraction, when in a state of irritability, with or without the existence of organic disease. But as spasmodic stricture is still a favorite topic with medical men, and cases of permanent stricture are often confounded with it, and as this kind of contractility of the urethra is a point of some importance therefore in a practical point of view, it will be necessary first to enter a little in detail on the subject.

Contractility of the urethra.—Contractility is often sensibly felt on the withdrawal of a sound or catheter, although its introduction may have been attended with no difficulty. The urethra under such circumstances will be found to grasp the instrument with considerable force during its exit, even to the very orifice of the

glans, an occurrence which cannot be explained by the mere contraction of the muscles of the perineum. Notwithstanding the impossibility of demonstrating the existence of muscular fibres, the above is a strong presumptive evidence in favor of a muscular action in the canal. Throwing aside several of the arguments adduced on either side upon this contested point, I must confess that the following points appear to me to be highly confirmatory of the muscularity of the urethra, in addition to the fact already alluded to. 1st.—Other structures, apparently membranous, and equally unlike the fasciculated fibrous texture commonly met with in muscles are endowed with a power of contracting and relaxing, in a much greater degree than is ever found to take place in the membrane of the urethra. 2nd.—The *tœnia hydatigenia ovalis*, an animal consisting of a semitransparent membranous bag, met with in the brain, liver and omentum of sheep, when taken from its natural situation, and kept in tepid water, contracts and relaxes the different parts of its bag to a considerable extent.* 3rd.—The sphincter muscle of the *Physalis pelagica* or Portuguese man of war, is seen to act beautifully, but yet quite transparent, and so is that peculiar fasciculated structure on its back (something like a cocks comb in form) by means of which it contracts and expels air. 4th.—The contraction of the tube, where it penetrates the coats of the bladder, presents an

* Sir Ederard Home.

obstacle, which can be overcome only by the exertion of force, and this obstacle is vastly increased in the distended state of the bladder, during which the fluid is constantly finding its way into this receptacle. 5th.—In the larger animals, particularly the horse, where the structure is more easy of investigation, and the functions of the urethra precisely the same as in man, the strong muscular fibres encircling the urethra cannot be overlooked,* and this analogical argument does not appear to be invalidated by Mr. Shaw's statement that the appearance in the horse proceeds from the ejaculator seminis being continued up to the glans. Such *vital contractility*, if not muscularity of the urethra forms, however, no durable impediment, and gradually subsides, when introducing or withdrawing an instrument, by allowing it to remain in the urethra, and diverting the patient's attention.

In real *permanent* stricture the change of structure is not confined to the smooth membrane constituting the lining of the canal, but extends to the surrounding textures, obliterating the cells of the corpus spongiosum, the bulb of the urethra, or the cellular texture surrounding the membranous portion. Such is particularly manifest in strictures of long standing, the organized lymph becoming of almost cartilaginous hardness.

Seat of stricture.—The most usual seat of stricture is immediately behind the bulb about $6\frac{1}{2}$ or 7 inches

* Mr. Samuel Cooper.

from the external orifice. The next frequently constricted part is about 4 inches from the orifice where the penis bends upon itself, and lastly the orifice is sometimes the seat of stricture. These are the points where the canal is naturally the most contracted. Stricture is rare at any intermediate points without the presence of the disease at these particular parts. That portion which passes through the prostate is very seldom indeed the situation of stricture.

Varieties of stricture.—The disease may either occupy only a small portion of the passage, as though the part were surrounded by a pack thread, or the canal may be contracted to more than an inch in extent, owing to its coats, and internal membrane being irregularly thickened and forming a winding canal. Several portions of the urethra may be the seat of the disease at the same time, especially at the two most usual points anterior and posterior to the bulb. A membranous band of organized lymph occasionally crosses the canal termed the bridle stricture, which can be detected by the impression it imparts to the extremity of a soft bougie, introduced for the purpose of examining the stricture. There is considerable variety both as to the density and figure of strictures.

Effects of stricture.—The calibre of the urethra anterior to a permanent stricture becomes contracted owing to its never being fully distended, whilst on the contrary, it becomes considerably dilated posteriorly from distension; it loses its expulsatory power and the

urine lodges in the latter cavity, which runs off after the patient has supposed that he has voided all his urine. Calculi and mucus are likewise sometimes collected there. Ulceration may take place behind the stricture with escape of the urine into the cellular tissue. The effusion of lymph around, often forms a barrier limiting the extent of the infiltration previous to the bursting of the canal, fistula in perineo being usually the consequence. The abscess is slow in its progress and is accompanied with considerable induration in the perincum. Such collections of matter produce numerous sinuous ulcers in the perineum and scrotum, sometimes extending to the rectum, attended with the most distressing symptoms occasioned by the constant discharge of foetid pus and urine. Such accidents are followed by a subsidence of the more acute symptoms of stricture; there is less irritability, and the cure is more readily accomplished. I have witnessed instances where the perineum and scrotum have become thickened and hypertrophied to an enormous size in India, and the anterior portion of the canal almost obliterated from disuetude. A boy, about 12 years of age, presented himself to me at Delhi with an extensive callous fistula in perineo, occasioned by great violence and laceration, used in extracting a calculus by the native operation. The whole of the urine escaped by the opening, and the urethra anteriorly was almost obliterated. A large friable calculous was formed impacted anterior to the fistula, opposite the scrotum.

The *causes* of stricture are inflammation of the mu-

cous membrane, from whatever circumstance produced, whether from gonorrhœa or any other source, or from external injury, as falls on the perineum, which cause usually the very worst description of stricture. Gonorrhœa is undoubtedly the most frequent source of the disorder. Inflammation of a chronic kind is established, with deposition of coagulable lymph on the outer surface of the mucous coat, which membrane is itself also thickened. Congenital malformations of the orifice are the cause of stricture and other affections of the urethra and bladder.

Symptoms and effects of stricture.—In the first instance the symptoms of stricture are merely frequent micturition with diminution of the stream, in consequence of the narrowing of the passage. Such symptoms being rarely accompanied by pain, do not usually attract any particular attention of the patient. But as the impediment increases he complains of pains in his loins or hips, swelling of the inguinal glands or testicle, gleet, hæmorrhoids, or irritability about the anus. The stream of urine is forked or twisted, or divided into several small ones. Micturition is frequent, particularly at night. The time occupied in evacuating the contents of the bladder is much longer than natural, commencing at first by drops, accompanied by straining. In severe cases the exertion of the abdominal muscles and levator ani cause the contents of the rectum to be sometimes simultaneously evacuated. Hernia may likewise be induced by the same cause.

In consequence of increased efforts, the muscular coat of the bladder becomes hypertrophied to a considerable extent, and contracted in its diameter. The fibres are more developed, and collected into fasciculi, and there is often protrusion of the mucous coat between the muscular fibres producing cysts, which, by the repetition of these spasmodic muscular contractions, and the want of resistance, dilate to a considerable size, having a contracted neck. These cysts generally occupy the fundus of the bladder. These changes are well represented in Plate IX figure 3.

Sexual intercourse increases these symptoms, partly in consequence of the excitement of the orgasm, and partly in consequence of the great degree of contraction of the canal in coitu, which does not so readily relax afterwards. Irritation and tenderness at the seat of stricture is increased, which is augmented by the contact of urine, and causes a gleet discharge. There may be a retrograde movement of the seminal fluid, owing to the impossibility of its finding an exit through the constricted part, and this fluid may be evacuated afterwards with the urine. This a very common disease of the natives of India termed by them "d, had" and "jirr éyan," probably owing to relaxation and atony of the ducts of the vesiculæ seminales, and from *chronic inflammation* in subjects exhausted by masturbation and debauchery, and in which Professor Lallemand, vide Plate IX, fig. 4 has so successfully employed the *porte-caustique*. In other instances the semen passes

through the stricture after the orgasm, but without impetus. Nocturnal emissions are often attendant on stricture.

Cold, intemperance and various other causes are apt to induce inflammation extending to the bladder; the frequency of micturition is very much increased, and the urine is very turbid. Purulent matter is sometimes voided, or a mixture of pus and gelatinous mucus, especially in severe and protracted cases.

These attacks of inflammation sometimes extend to the peritoneum and carry off the patient.

Paroxysms of fever occasionally take place, especially where there is inflammation of the bladder and purulent discharge from that viscus. The sweating stage is more profuse than in common intermittent fever.

Strangury and retention of urine are among the consequences of this disease, especially when the patient has committed any excesses in diet, and partakes freely of fermented liquors, exposes himself to low temperature, or neglects to void his urine for a longer time than ordinary.

It is no uncommon consequence of a protracted stricture for the pelvis of the kidneys and ureters to dilate enormously and to contribute a mucous or purulent discharge with depositions of the phosphates, or of lithic acid,—vide Plate IX, fig. 5.

Constitutional symptoms.—The appearance of the patient is peculiar, his complexion is sallow and wan, and his countenance anxious. He is much emaciated, especially in the lower extremities.

Diagnosis.—Stricture is liable to be confounded with diseased prostate, stone of the bladder, or urethra, gonorrhœa, and common inflammation of the canal, or other sources of irritation, but the history of the case will generally facilitate whilst the introduction of a sound will clearly establish the diagnosis. The following, however, are the diagnostic marks usually mentioned by authors. The presence of calculi in the urethra may be ascertained by the preceeding symptoms of gravel, by the sharp pricking pain they produce, and by the collision of a sound against them, and often by their being obvious to the touch.

The distinguishing peculiarities between stricture and calculus vesicæ are, that in the latter the stream of urine is generally full, and sometimes suddenly stops; the patient is able to make water more easily in some positions of the body than in others; there is no obstruction on introducing instruments, and the calculus may generally be felt by such introduction.

Diseased prostate is to be suspected in elderly persons, when a bougie will pass seven inches and a half, without obstruction, but not into the bladder; the fæces will be flattened. The swelling of the gland may also usually be felt within the rectum, and with dexterity, a catheter of large size can be got over the projections into the bladder.

A Colonel in the army gave up his command and was proceeding with all expedition down the river

from a station in the Upper Provinces to Calcutta to place himself under the care of an eminent Surgeon of that Presidency. He had obtained a medical certificate for the purpose, and was exceedingly alarmed at a letter, he shewed me, from his medical adviser in Calcutta, recommending his immediately coming down and anticipating an abscess in the perineum. He consulted me on the river at Dinapore, and mentioned the extreme difficulty and pain which he experienced, in passing a small sized bougie. He described to me his symptoms. On my introducing a large sized catheter to which he was at first very reluctant to submit, it passed into the bladder without difficulty. There was enlargement of the prostate. To the great relief of his anxiety I assured him that he had no stricture, and no reason to apprehend abscess in the perineum.

In cases of stricture the gleety discharge and pain following coition comes on suddenly after the cause, and, if left to itself will generally decline in about a week, whereas in gonorrhœa a few days generally intervene between the exposure to infection, and the beginning of the symptoms, which then gradually increase to their acme, and only begin to subside as late as ten days after their commencement. In gonorrhœa also the pain in making water is more severe.

Pain being generally referred to the glands and a short distance beyond it, in most of these affections, is the chief cause of any obscurity which may exist in the diagnosis.

Treatment.—There are few strictures, however narrow, provided they can admit the point of the smallest bougie, that will not gradually yield to the stimulus and mechanical pressure of such an instrument, by dilatation, and absorption. The best description of instruments are the metallic bougies made of a mixture of zinc and tin by fusion, highly polished and conical. They may be constructed with a combination of other metals, but the above answer every useful purpose. Such instruments are sufficiently flexible to receive any degree of curvature, and are susceptible of a high polish, whereby they are less irritating, and slide with greater facility along the mucous surface; they also possess that degree of firmness which enables them to retain the curvature adapted for the urethra. The Surgeon should possess a considerable number of every variety and gradation of dimensions.

Much has been written of late on the efficacy of straight bougies, and there is no question that they can be made to take the direction of the urethra, but curvature is certainly the natural direction of the passage and therefore the most natural for the passage.

In the generality of cases, the previous introduction of wax or gum bougies is quite unnecessary, in India they are quite useless. They will bend under the most skilful hands: they do not enable the Surgeon to ascertain the exact situation of stricture with that certainty that the metallic ones do. The *stain* on the latter from the moist urethra gives an accurate mark of the

extent to which the instrument has passed. It is of the first importance to correct any acrimonious state of the urine that may exist, which will tend greatly to reduce the irritable state of the urethra, and facilitate the cure. This will be best accomplished by saline aperients, by bland mucilaginous diluents, and by the liquor potassæ.

On introducing the metallic bougie the patient should be placed in the horizontal posture, with the thighs separated. Guided by the ordinary size of the stream of urine, and the urgency of the symptoms, an instrument, usually of medium size, and well oiled and having a curvature corresponding with the natural curvature of the urethra, should be passed down to the stricture with the utmost gentleness, the penis being slightly elongated forwards until the point of the instrument has reached the arch of the pubis in order to avoid the point coming in contact with the lacunæ or folds of the urethra. After this the organ should be relaxed, to obviate any spasmodic action of the muscles. On arriving at the obstacle no efforts should at first be made, for in almost all cases there is spasmodic action of the perineal muscles and perhaps of the urethra itself, especially when the patient is sounded for the first time. The bougie should merely therefore be permitted to rest by its own weight on the stricture. I usually leave it in the patient's own hands, as the best security against any undue pressure. After two or three minutes pause, devoted to a few en-

quiries, and also with the view of withdrawing the patient's attention, the Surgeon should now resume the instrument, and with a moderate degree of pressure, still diverting the patient's attention, insinuate the point through the obstruction. The handle should be inclined towards the Surgeon with that degree of inclination corresponding with the situation and distance to which the instrument has reached, and the curvature of the canal, which his anatomical knowledge will suggest to him. Should the stricture be very unyielding somewhat more dexterity and manipulation will be required, especially if it is inflamed, in which case, unless the symptoms are urgent and dangerous he should immediately desist.

At each introduction two bougies, should be employed; the first of which being the one which was introduced on the previous occasion, and the second a size larger, thus gradually ascending the scale until the urethra is capable of admitting one of tolerably full dimensions, regulated always by the very varying calibre of the passage in different individuals. No. 15 is an ample size for any urethra.

Where the case has proceeded favorably without hæmorrhage or irritation, the instrument may be passed every second day. The most advantageous period is in the morning, after breakfast and evacuation of the bowels. If, on the contrary, constitutional irritation has been produced, the intervals should be much

longer, or altogether suspended for a time. Such simple measures, in the generality of cases, will be adequate for the cure of most contracted strictures accompanied with a soothing treatment, and the avoidance of stimulating diet. Laxatives should be regularly administered.

In strictures of cartilaginous hardness in which the canal is contracted to the smallest possible dimensions, the hot bath will be found a valuable auxiliary. A minute firm conical silver catheter is to be employed. This should be introduced with a certain degree of pressure in the proper direction. If the stricture is anterior to the bulb, it can be grasped between the fingers of the left hand, whilst with the right the instrument is insinuated, which thus favors its safe introduction through the obstacle. If posterior to the bulb a similar guidance and security is afforded by placing the forefinger of the left hand in the rectum. These precautions are absolutely necessary to avoid the the serious consequence of making a false passage, indeed there is no point which requires more the tactus eruditus of the Surgeon than this manipulation. Should the catheter have entered the stricture, it will be felt embraced by the part, and, on withdrawing the pressure, it will remain stationary. On the other hand, should it not have entered the stricture, but be pushing it before it, the instrument will recoil the moment the pressure is diminished or discontinued. The sensation imparted, should the instrument have unfortunate-

ly found a false passage, is of a peculiar grating nature which, when once experienced will scarcely be forgotten or mistaken.*

Bougies have by unskilful hands, been forced into the scrotum and even into the rectum. Should such an accident have occurred, the patient should be directed to retain his urine, in order that an opportunity may be afforded for a clot of blood to form and adhesion to take place, before the extravasation of urine into the surrounding cellular texture occurs.

The instrument is to be retained in the bladder by means of a piece of tape fastened to each of the rings of the catheter, brought under the thighs, and secured to another tape or bandage passed round the waist. The mouth of the catheter should be secured by a wooden peg, which can be removed when necessary for the evacuation of the urine. The instrument ought to be retained for 24 hours, and longer if the patient can bear it. The effect of such treatment is to produce ulceration of the stricture, with gradual relaxation. When the catheter has become loosened, and capable of being moved with facility through the stricture, it may be withdrawn, and one of larger dimensions introduced. When once such a degree of advancement towards a cure has been effected, the case must be treated with metallic bougies as in ordinary cases. Such is the most successful method of overcoming some of the most

* Liston.

obstinate forms of the disease. The pain and pressure produced by the catheter is very severe at first, but gradually subsides, and the parts become less excited by the stimulus.

Caustic bougies are now very generally exploded. Their warmest advocates have themselves related some fatal results; extensive inflammation and suppuration, retention of urine and profuse hæmorrhage—false passage and fistula in ano. The only instances in which they can be safely employed is where there is fistula in perineo behind the stricture. In such instances there is no risk of its producing retention of urine. There is less irritability, and this circumstance renders stricture more susceptible of the treatment by dilatation. Where they are employed much caution is requisite to prevent the nitrate of silver coming in contact with any other part except the stricture.

Objections are still more applicable to the employment of the potassa fusa, when freely used. When employed according to Mr. Whateley's plan it is perfectly inert. He recommended a small fragment of potassa fusa, not larger than the 17th of a grain to be placed into the aperture of a bougie which is to be filled up with cerate. By its contact with the oily substance it could only have been converted into soap.

Cutting catheters I have never used. They are uncertain and hazardous but may in rare instances be of use. Stafford's is the best.

Impermeable Stricture,—that is, the obstruction in-

curable by the usual process of dilatation and absorption, must be treated in the following manner. The patient is placed in the position for lithotomy, a large steel bougie or sound is inserted into the urethra down to the seat of the disease, an incision made upon its point, the continuity of the canal searched for with a probe, the indurated substance forming the stricture cut open, a straight catheter carried hence into the bladder, to ascertain whether the canal is capacious enough; then the sound withdrawn, a flexible gum catheter inserted at the meatus externus, and brought out at the wound, here doubled, and the point re-inserted into the urethra from the wound into the bladder. This catheter to be secured and retained for six or eight days, then withdrawn, and a silver one of a large size inserted for a few seconds. This is to be repeated in the course of three or four days, and afterwards at longer and longer intervals, but the instrument is to be kept in longer each time, precisely as in the treatment of ordinary stricture. The individual must be confined to bed during this treatment.

This impermeable stricture is generally produced by the person falling on the perineum, the urethra rupturing and inflaming, and occasionally forming urinary fistulæ.*

Treatment of occasional symptoms.—Where there is much spasmodic irritability of the urethra, the anodyne

* Lizars, Part II. p. 262,

suppository is a valuable remedy, combined with exhibition of a dose of calomel and antimony, and the use of the warm bath, together with the diluents and other means already alluded to.

Inflammatory symptoms will be best combated by similar measures, together with leeches to the perineum, and in some plethoric subjects venesection to syncope.

In an *irritable state of the urethra* attended with chronic inflammation where there is frequent inclination to void the urine, the following formula will be found of benefit.

R. Sp. Æth. Nitr. 3j.
 Hydr. Bichloridi gr. $\frac{1}{4}$
 Misturæ Camphoræ ʒiiss.

ft. haustus ter quotidie capiendus.

Hæmorrhage from the urethra may be suppressed by continued pressure of the finger, or a pledget and bandage on the perineum. The pressure should be commenced from behind, and gradually advanced forwards until the point where the bleeding proceeds from is ascertained, to be compressed. Sir Astley Cooper has cut down upon and divided the artery of the bulb with success. Hæmorrhage *per urethram*, sometimes occurs from the bladder, and in these cases any pressure causing the retention of blood in that viscus, or (by pressure on the urethra) any retrograde motion of the blood into it, must be bad. Mr. Turner has always used the tinctura ferri sesquichloridi, and given this in ten minim

doses until weakness was produced and the hæmorrhage stopped. The “rationale” of this *practice* he cannot explain, but its *excellence in practice* is vouched for.

Extravasation of urine is exceedingly rare under proper treatment. When it has followed neglected cases, early and extensive incisions extending towards the nates will allow of a ready exit to the infiltrated urine, and the sloughs of cellular membrane. This with constitutional treatment, and attention to the stricture itself, on principles already referred to, are the measures most conducive to conduct the patient with safety through this serious accident. The stricture itself, wherever practicable, should be included in the incision.

Some of these unpromising cases, with extensive sloughing and denuding of the testicles and other parts, do sometimes recover surprizingly by such treatment, complete reproduction taking place. Fluctuation must not be waited for; the perineal fasciæ often hindering its being felt. The patient will frequently labour under great prostration and typhoid symptoms, rendering it necessary for him to be supported by wine, ammonia, brandy and stimulating diet. Extravasation from bursting of the urethra sometimes, though rarely, takes place into the corpus spongiosum, bulb, and glans, as well as into the cellular texture around.

By the restoration of the natural dimensions of the canal, fistulous openings generally heal in a short time. Should their reparation be slow, an eschar is to be pro-

duced on their callous edges, by the application of the actual cautery, which excoariates and excites the surface to a more vigorous action. This is followed by cicatrization and contraction. The cautery should be repeated when the sore shows no further disposition to contract. Autoplastic operations may sometimes be undertaken with success—see *autoplastic operations*.

SEC. III.—DISEASES OF THE PROSTATE GLAND.

The use of the prostate gland is still too little known, to enable physiologists to throw any light on the causes of its various diseases. It is considered by many anatomists to be nothing more than a collection of mucous follicles. It secretes a mucous and whitish fluid by ten or twelve orifices, which mingling with the semen adds to its quantity, and perhaps is secreted first to lubricate the internal surface of the canal, and prepare it for the passage of the seminal fluid, by rendering the internal surface more slippery.

The prostate gland is subject to common inflammation of its texture, as well as to chronic inflammation with enlargement of scirrhous hardness. Calculi form also within its folliculi. Varicose enlargement of its vessels sometimes takes place, and it is likewise subject to suppuration and scrofula, exhibiting the same white curdy matter discovered in serofulous absorbent glands. It sometimes attains an enormous size.

Common phlegmonous inflammation attacks individuals at all periods of life and is attended with a sense of heat and weight about the perineum, and a continual throbbing pain about the neck of the bladder. The pain is increased considerably on the patient's going to stool; the fæces are flattened; there is tenesmus, and frequent inclination to void the urine. The enlargement can be felt in the rectum and its presence imparts to the patient the sensation of excrement in the extremity of the rectum. This most distressing and urgent symptom is the impediment to the passage of the urine, in some instances amounting to complete retention. There is generally an oozing of the urine after the bladder has become distended to a certain point; suppuration may be expected where these symptoms have continued unabated for more than a week, or increased in severity, abated, and again become severe, especially when preceded by shivering.

The constitutional symptoms are indicated by a hard and frequent pulse, thirst and other symptoms of pyrexia.

Treatment—The symptoms of retention of urine may become so urgent as to render the immediate introduction of the catheter absolutely necessary for the safety of the patient, even at the risk of somewhat increasing the symptoms from the irritation. The catheter should be large and possess a greater length and curvature than ordinary. It should be immediately withdrawn when the urine has been evacuated. Should the retention of urine not be so urgent, the antiphlogistic treatment will ge-

nerally be effectual in relieving the complaint, and should consist of local abstraction of blood, and in some instances venesections, the warm bath, poultices and fomentations, with mucilaginous drinks and low diet. The introduction of the opiate suppository formerly alluded to, in a full dose will be found an invaluable palliative in alleviating pain and irritation.

Abscess may be sometimes evacuated by the catheter.

Calculi in the prostate may attain, to so great a size as to be felt. They rarely require an operation for their removal. Calculus vesicæ may be co-existent with the disease.

Chronic inflammation and enlargement of the prostate is a much more frequent disease, especially in advanced life. Its size is often so considerable as to form a projection into the bladder of some inches, bending the urethra forwards, and causing the difficulty which exists to the introduction of a catheter. It enlarges sometimes laterally, but more generally at its posterior part in the middle lobe, which produces the peculiar curve of the urethra towards the symphysis pubis, and elongation of the canal, and which forms the obstruction in passing the catheter. The handle of the instrument requires to be carried down towards the thighs on reaching this point, in order to overcome the obstruction by tilting of the further extremity of the catheter over it. The lateral enlargement may proceed to a considerable extent, without occasioning

any retention of urine, but not so when the disease is seated in the middle lobe. The right lobe is sometimes the most enlarged, and, at other times the left, the surface may become ulcerated; and the secretion of the gland viscid and abundant.

The same morbid changes in the bladder, ureters and pelvis of the kidney are liable to occur as consequences of diseased prostate, as in stricture, viz. cysts of the mucous membrane, thickening of the muscular fibres, dilatation of the ureters, and pelvis of the kidneys.

The *symptoms* are constant dull pain, and weight in the situation of the gland, lancinating pains towards the bladder, ureters or urethra, the fæces are tape shaped, frequent but imperfect efforts are made to void the urine. A portion of the contents of the bladder always remains behind, which possesses a strong ammoniacal odour, and is often very turbid owing to the decomposition it undergoes, the enlargement acting like a valve. There is often prolapsus ani, and hæmorrhoids. The immediate cause of complete retention where the disease is situated in the middle lobe, is generally owing to the patient having neglected to void his urine in due time. The accumulated fluid presses down the lobe, and thus mechanically closes the mouth of the urethra. Another cause is, that the detrusor urine loses its natural expulsive power. The enlargement takes place slowly. On post mortem examination, membranous septa are discovered passing through a dense compact almost homoge-

neous whitish brown mass, and its surface is sometimes irregularly lobulated and of schirrous hardness, but not of malignant character.

Diagnosis.—The disease may readily be distinguished from stricture, by the distance to which the catheter can be introduced in the former than in the latter complaint as well as by the foregoing symptoms.

The causes of the disease are whatever circumstances tend to increase the determination of blood to the genitals. It is exceedingly common amongst aged Moosulmans in India like old débauchées in England; whose labidinous and sedentary habits are notorious; by a greater degree of excitement than their constitutions are able to bear, the secreting functions of the gland are called forth into action. Whether does the gratification of sexual intercourse continue in old age, generally, by the mere excitement attending the ejaculation of the secretion of this gland, when the spermatic secretion has almost or altogether subsided?

Treatment.—Alleviation of sufferings, and perhaps a check to the growth of diseased prostate, are the only indications within the power of medicine. It does not appear, to be under the slightest influence of iodine, or of any medicines which stimulate the absorbent system; suppositories of conium and Hyoscyamus will answer the first object. Cupping on the loins, leeches to the perineum, with saline laxatives and enemata, are the chief means of fulfilling the second. Irritation will be allayed also by demulcent drinks,

and by the following formula of Sir Astley Cooper's given twice or three times daily.

R. Liquoris Potassæ gtts. xv.
 Balsami Copaibæ gtts. v.
 Misturæ Comphoræ ʒjss.
 Mucilaginis Acaciæ ʒij.

Mr. Lizars has found great benefit from the employment of the common aloetic pill in combination with hyoscyamus.

Where it is necessary to draw off the urine a silver prostatic catheter of considerable length, calibre and curvature will be found to enter the bladder with greater facility than one of elastic gum. The surgeon should aid the introduction by his finger passed into the rectum, so as to guide and tilt the point of the instrument over the enlargement—warm water should be injected afterwards, and this should be followed by warm oil and opium. Some surgeons are in the habit of allowing an elastic gum catheter to remain in the bladder—this instrument will enter with greater facility on reaching the obstruction by withdrawing the stilet. The patient should be taught to introduce the catheter every eight hours.

“ Perforation of the gland is done with a conically pointed catheter, the *sonde conique* of the French, with a canula shaped like a catheter, having a sharpened stilet or with Stafford's lancetted stilet. I consider such a mode of proceeding very hazardous. Some recommend a patient affected with enlarged prostate to wear a

flexible gum or pewter catheter, and an elastic gum urinal, which last is now constructed of a long tubular shape to wear inside of the leg of the trowsers.

Various medicines are recommended as palliatives, namely, small doses of the balsam of copaiba, camphorated mixture, mercurial drops, hyoseiamus, and opium; scarifications, acupuncturation, galvanism, and iodine have been employed.

Serophulous enlargement now and then occurring is to be treated with iodine.

True scirrhus of the prostate seldom or never occurs, but medullary sarcoma occasionally does, in which case there is hæmorrhage into the bladder, the blood requiring to be pumped out with a syringe and catheter from time to time. The bladder, ureters, and kidneys become involved, and undergo the same changes as in the chronic hypertrophy. Medicines are of no avail. Polypi growing from its vesical aspect, admit of no remedy.

A varicose enlargement of its plexus of vessels sometimes takes place, which may be kept under by leeches and the nitrate of silver.

Calculi, consisting of the phosphate of lime, are secreted in its duets, but produce no irritation until they increase in number and magnitude, then they simulate chronic induration of the gland, and excite analogous symptoms.

As they increase, so does the membranous cyst, while the substance of the prostate is absorbed, and in

some they can be felt from the rectum. They sometimes advance into the urethra, and are discharged; on other occasions, they excite ulceration towards the rectum, and are passed by stool; in some they only project into the urethra, and give rise to symptoms of calculus vesicæ; in others, they are complicated with stone in the bladder. In the majority of cases, the urethral mouths of the ducts are closed by inflammation.

Sir A. Cooper removed prostatic calculi, by cutting down upon them from the perineum, as in the preliminary incisions of the lateral operation of lithotomy; a staff also had been previously inserted into the bladder. S. B. Brodie, talks of extracting them with Weiss's forceps. Wilson recommends to cut upon them as in the operation by the gripe. Crosse, from the rectum, the gut being dilate by the speculum ani.

Cowper's Glands,—are sometimes attacked with acute inflammation in consequence of gonorrhœa; and from repeated attacks of this disease or gleet, or stricture, they occasionally suppurate, and sometimes rupture into the urethra, while at others the abscess points into the perincum. If the latter is the case, the abscess should be freely incised, to prevent sinuses from supervening; if the former, the bougie should be inserted once a week to prevent constriction of the urethra.”*

* Lizards Part II. p. 269.

SEC. IV.—INFLAMMATION OF THE BLADDER.

The mucous membrane of the bladder may become the seat of inflammation from a variety of causes ; whether from violent or suppressed gonorrhœa, from injury to the urethra, from the presence of foreign bodies, from disease of the kidneys, or any other source of direct or sympathetic irritation.

In acute inflammations the evacuation of urine is attended with intense suffering. There is incessant inclination to evacuate the urine and a mucous, purulent, and bloody discharge is mixed with it. The mucus is ropy and thick, and separates and subsides to the bottom of the fluid in considerable quantity. The pain subsides on each evacuation. The inflammation extends often along the course of the ureters, indicated by nausea, vomiting, pains in the loins, and colicky pains.

The symptoms are less severe when the inflammation is of a chronic character ; there is uneasiness in the perineum, pelvis, and glans ; pain on evacuation of urine which is high colored and scanty, and the voiding of which is followed by alleviation of pain. The irritability is extreme ; sometimes there is ulceration of the bladder with great vascularity, generally of the mucous surface.

The indications of cure will be best fulfilled by antiphlogistic and anodyne remedies, and demulcent

drinks—with this view leeches to the perineum and hypogastrium, the warm bath and sedative suppositories should be prescribed together with laxatives. The formula already attended to for chronic enlargement of the prostate will be of the highest advantage in the chronic forms of this disease remaining after intense inflammation when all other means have been unsuccessfully employed.

V.—RETENTION OF URINE.

Retention of urine.—Many of the causes of retention of urine have already been alluded to. It will therefore only be necessary to notice the modifications of treatment adopted to the variety of causes from whence retention arises.

Symptoms,—retention of urine, named also ischuria vesicalis, is an accumulation of the urine in the bladder from obstruction in the urethra, or paralysis of the bladder itself; it is improperly said to be either partial or total, complete or incomplete. The patient complains of acute pain in the hypogastric region, has a constant desire to make water, severe straining, and frequently an inclination to void the fæces, causing sometimes prolapsus ani. He voids from time to time a few drops of urine, occasionally bloody, though in some the quantity is so considerable as to deceive the practitioner; on examination, however, a prominent swelling is felt

above the pubes, and on inserting the finger into the anus, the bladder is found turgid. If the urine be not drawn off, the bladder will lose its contractile power, inflame and slough, or even rupture; the urine escapes either into the abdominal cavity, or is extravasated into the cellular tissue of the pelvis, hence life is soon destroyed.*

In retention from *paralysis* especially where originating from over distention in advanced life, the catheter should be of large size, the organ will more readily recover its tone, when the catheter is introduced at intervals of six or eight hours, in preference to allowing the instruments to remain in continually acting as a source of irritation, and preventing the natural muscular action of the viscus.

It is very questionable whether stimulants directed to this viscus have ever materially improved its muscular power. The tincture of cantharides, blistering, moxas, friction and electricity have been advocated. But the removal of the paralysis as a consequence of some other affection will be most facilitated by remedies directed to the cause so far as practicable, whether that may be injury or disease of the spinal chord or nerves.

Retention from *stricture* has already been noticed. It requires the immediate introduction of the catheter. No delay for the employment of antiphlogistic mea-

* Lizards, Part II. pp. 269—270.

tures is admissible. The warm bath will be of advantage if at hand. Should the introduction of the instrument be found altogether impracticable, which ought very rarely to be the case, the only alternative is that of puncturing the bladder. For this purpose, the method through the rectum should be preferred. On introducing the finger, the distended bladder will readily be felt, pressing downwards. An opening may readily be effected by means of a curved trocar guided on the fore and middle finger of the left hand, and directed in the axis of the bladder upwards and forwards, the operation is neither attended with difficulty or danger, and as the wound heals as soon as the stricture is removed there can be no serious objection to the operation—vide Plate X, fig. 1.

But the most effectual and permanently beneficial operation is that of *cutting down upon the stricture*. This is readily accomplished by previously introducing a silver catheter down to the seat of stricture, and cutting directly on the line of the raphe through the whole extent of the stricture; after doing which the instrument is pushed on to the bladder. It is requisite to retain it in the bladder for three or four days, or perhaps longer.

In retention from *inflamed urethra* the treatment will consist in antiphlogistic measures, the warm and hip baths. fomentations, opiate suppositories and enemata. Should this be ineffectual the catheter must be employed though calculated to aggravate the symp-

toms, failing in which the bladder can readily be penetrated by the rectum. Similar principles are applicable to *abscess in the perineum*, as well as to retention from *laceration* or injury, but in the latter case the catheter must be introduced immediately after the accident before the individual can have evacuated the bladder, and the urine have extravasated into the cellular tissue. It will be necessary to secure the catheter in the bladder.

Retention from effusion of blood may be relieved by the catheter to which it may be requisite to attach an exhausting syringe, injecting the bladder with warm water.

Should all efforts for relief of *retention from diseased prostate* be ineffectual, it has been recommended to puncture the third or middle lobe of that gland. It must be exceedingly rare if ever that such a measure is requisite. It may however become a last alternative ; as it is considered dangerous to puncture the bladder by the rectum, in consequence of the impracticability of reaching it behind the enlarged prostate, and the risk of wounding the peritoneum which forms the superior boundary of the trigone space. Never having had occasion to employ such an alternative, I cannot speak from experience on the subject, but the instrument recommended for this purpose is a long catheter with an open extremity provided with two wires, one blunt and bulbous at the extremity, the other pointed as a trocar, both made so as to project a short way be-

yond the end of the canula. The canula is passed on to the resisting body, and its proper position ascertained by the introduction of the finger per anum. The orifice is occupied by the bulbous wire, which is then withdrawn, and its place supplied by the trocar, the instrument being held steadily in the proper direction. The trocar or stilet is pushed forward along the canula; the former is then withdrawn, and the latter retained by means of oiled silk tapes; an elastic gum catheter may be afterwards substituted, passed by the natural canal if practicable.

In conclusion it may be remarked, that there is no department of surgery requiring more discrimination, judgment, and dexterity, than the treatment of retention of urine, arising from its various causes; numbers have fallen sacrifices to neglect or unskilfulness, and it will readily be conceived how highly estimated the successful practitioner is, and how truly grateful the patient to the surgeon, who relieves him from a state of extreme agony and distress to that of safety and ease.

VI.—INCONTINENCE OF URINE.

Incontinence of urine—has already been alluded to as a symptom of other diseases. It is also a prominent symptom in some severe forms of disease yet undescribed.

Incontinence not unfrequently arises from *mechanical causes*, as from the peculiar manner in which some calculi are lodged in the neck of the bladder. I extracted a calculus from a boy consisting of two irregularly nodulated portions joined to each other by an isthmus. One portion was impacted in the neck of the bladder and the other in the membranous portion of the urethra. A groove ran longitudinally along, from one extremity to the other, forming a channel for the stream of urine. This patient suffered constantly from incontinence. It sometimes occurs after the lateral operation of *lithotomy*.

This affection as a symptom of inflammation of the bladder has been noticed. The inflamed viscus can scarcely bear the presence of the least quantity of water.

Incontinence is not infrequent in children from *irritability* of the neck of the bladder. It generally occurs in those whose constitutions have been weakened by previous disease. The patient is unconscious of the contraction of the bladder which occurs during the night. It arises frequently from disorder of the digestive organs, and by regulating the diet, and improving the tone of the constitution the disease disappears. The cold bath, the tepid, and the warm bath are sometimes beneficial. Should these measures be unavailing a blister to the hypogastric region or the perineum will generally be effectual. The patient should also attend to the evacuation of the bladder for which pur-

pose he should be awakened at intervals during the night.

Incontinence of urine is often a sequel of retention. In elderly persons labouring under enlargement of the prostate and debility of the muscular coat of the bladder, retention of urine may occur in consequence of the individual neglecting to evacuate the bladder in time. The patient afterwards on attempting to void his urine, finds he is totally unable to do so after a certain time, the resistance of the neck of the bladder is overcome, and a partial flow or dribbling of the urine takes place, whilst the bladder is still distended to a considerable degree. In other words there is paralysis of the bladder, and partial paralysis of the sphincter. In some instances the patient never regains the tone of the parts, and is obliged to relieve himself always by the employment of the catheter. In other instances the viscus gradually recovers its power under regulated employment of the catheter, and attention to the general health. The disease is readily distinguished, for notwithstanding the Surgeon is called to treat an incontinence, on examining of the abdomen the region of the bladder will be found greatly distended.

Incontinence with irritability of the bladder may be brought on from very slight causes, and is a most formidable disease. Young men with irritability of the bladder in the society of ladies have from motives of delicacy restrained their desire of evacuating their urine for a long period, causing great agony at the time,

and have led in consequence a miserable existence from irritable bladder for the remainder of their lives.

SEC. III.—DISORDERS AFFECTING THE SECRETING ORGAN OF GENERATION IN THE MALE AND ITS COVERINGS.

I. *Acute inflammation of the testicle* (orchitis) is liable to occur as a consequence of gonorrhœa, or from external injury. It is characterised by severe pain and swelling in the epididymis and testicle. The severity of the pain is accounted for by this highly vascular and sensible structure being compressed by the unyielding tunica albuginea. The delicacy of the organization of the testicle, and the delicacy of the numerous tortuous vessels along which semen is conveyed, account for its tendency to congestion, and for the difficulty with which a resolution of this affection is accomplished. We accordingly find that the epididymis remains enlarged for a long period, often for the remainder of life, and there is reason to believe that the testicle sometimes becomes useless from the intensity of the inflammation and degree of effusion obstructing its minutæ tubuli seminiferi and thus impeding its secreting functions.

The *causes* of the disease are extensive inflammation and irritation of gonorrhœa, especially if injections or bougies have been injudiciously used, the discharge sud-

denly suppressed, or violent exercise taken by the patient. The testicle is very liable to sympathize with irritation of the urethra, the irritation extending along the vas deferens. It may also arise from debauchery whilst labouring under gonorrhœa. Blows or injuries to the organ, under any circumstances, will produce the affection, as will the injudicious employment of instruments as in lithotrity.

Symptoms.—There is effusion of serum, and sometimes of blood between the tunicæ vaginales which greatly increases the swelling. Sickness, and vomiting attend the affection, with constitutional irritation. The spermatic chord is exceedingly tender to the touch, and enlarged, and there is sometimes pain in the lower part of the abdomen which may be mistaken for enteritis, but that it is attended with a sawing pain in the loins. The erect position greatly aggravates the symptoms from the weight and dragging of the inflamed parts.

The inflammation may proceed to such an extent as to terminate in suppuration, especially in scrophulous, irritable and infirm constitutions, still more endangering the future functions of the part.

The *treatment* consists in absolute rest, and the employment of antiphlogistic measures both general and local. Opening a scrotal vein and the application of leeches followed by constant fomentations and poultices will afford great relief. Cold applications are not so beneficial as warm. Aperients, low diet, and antimonials must be at the same time prescribed. When the se-

verity of the symptoms is subsided, our attention should be directed to the discussing of all depositions the result of inflammation. The part may be bathed with a tepid solution of the muriate of ammonia. The linimentum saponis cum opio may be gently rubbed on the part, or an ointment of iodine. Equal parts of gum and mercurial plaster interposed between the scrotum and the suspensory bandage will afford much relief, and will defend the organ from irritating friction and motion, and stimulate the absorbents to discuss the remaining swelling. Repeated blisters have been recommended for the same purpose, but they are very painful to the patient, though effectual, especially from the rest which they necessarily enforce. Mr. Lizars recommends fumigation with mercury.

Should the disease have ensued on the suppression of gonorrhœal discharge, measures should be taken to restore that discharge by leeches to the perineum, fomentations and the warm bath, and by passing a bougie.

“ In the course of three days after the mercurial fumigation, one with camphor should be applied. Every trace of swelling which is chiefly in the epididymus, ought to be carefully removed, to prevent any risk of a relapse or a chronic action being induced, and leading hereafter to a malignant deposit. In such cases also, the urethra should be restored to its pristine health ; but this is very tedious, in consequence of the swollen testis, for no cubebs,

copaiba, or cantharides dare be given, and several weeks, at least twelve, must elapse from the state of convalescence, before a bougie ought to be inserted into the urethra.

Young men under twenty years of age, affected with gonorrhœa and swollen testis, have not unfrequently one or both testes so atrophied, that they become completely emasculated.”*

II.—Chronic enlargement and induration of the testicle frequently occurs, whether as the result of previous acute inflammation, or from the irritation of stricture, and also from external injury. The tumor is large, irregular, hard, and unyielding. There is always some effusion into the tunica vaginalis, indeed hydrocele is frequently a consequence of the disease. In the majority of cases of hydrocele in Bengal, one testicle will be found more or less enlarged.

II.—This chronic affection will frequently be found to be connected with stricture of the urethra, and resist all efforts for its removal, until the original cause is removed by restoration of the healthy condition of the canal.

The treatment will consist in the administration of alteratives, as Plummer’s pill, and the application of counter-irritation. Much benefit is derived from the application of blisters and the insertion of a seton. The part should be suspended in this as well as in acute in-

* LIZARS, Part II. p. 252—253.

flammation, and discutient plasters applied of mercurial ointment and camphor, which should be tightly strapped up like the native "lungote."—Rest should be enjoined. The internal and external use of iodine and its compound is of use. The functions of the part should be occasionally exercised.

III. *Scrofulous testicle*.—Chronic inflammation of this organ is liable to be modified by the strumous diathesis. Softening and suppuration are very liable to occur, and the matter which escapes on incision has the peculiar curdy and unhealthy character of scrofulous abscess. A pale unhealthy *fungus* protrudes which is the glandular substance of the testicle. It has at first a dirty brown appearance, and afterwards is covered by granulations, so as to assume a red appearance. There is a copious and rather fætid discharge which oozes externally, the basis of the fingers being surrounded by red, inflamed, and thickened integuments and cellular membrane of the scrotum. The disease however is not of a malignant character, but occurs in people of unhealthy constitution.

An early opening should be made for the evacuation of the purulent effusion, the moment that fluctuation is detected; and measures should then be adopted to favor granulation and cicatrization. The vascular protrusion should be excised by the introduction of a sharp knife through its base, and its further growth suppressed by escharotics, or by pressure. Attention must at the same time be paid to the improvement of the gene-

ral health by tonics, change of air, diet &c. but it may be necessary to repeat the excision. The surface may be sprinkled with the acetate of lead, and contraction and cicatrization induced by stimulating dressings; the functions of the organ are of course destroyed, although the epididymis and spermatic chord are left behind. The affection is liable to invade both testicles.

IV. *Malignant tumors* of the testicle not unfrequently occur. The organ is subject to *medullary sarcoma*, to *schirrus*, to *fungus hæmatodes*, and to *fibrous*, or *soft tumors*. They may originate in benign growths, or may be of the malignant character from the commencement. It is unnecessary to describe the progress of malignant disease in the testicle, having already treated respecting each of these varieties as pervading this and other organs. The *medullary* tumor is liable to be mistaken for *hydrocele*. It is by no means uncommon and attains to considerable size. The history of the case however will assist in the diagnosis. There is no distinct fluctuation in *fungus hæmatodes*, the tumor yields to pressure from its elasticity. It is not of the pyriform shape of *hydrocele*, the pain is general on pressure, whereas in *hydrocele* there is only pain on pressing the testicle posteriorly, the weight is greater, and the scrotum is livid. When ulceration has taken place, a bleeding fungus frequently protrudes, the inguinal glands become soon affected and enlarge considerably, with extensive ulceration, and hæmorrhage. The chord is sometimes free and soft, appearing healthy between

the inguinal and scrotal swellings: in the advanced stages of carcinoma of the testicle, the chord is indurated and thickened. It is by no means common for carcinoma to attack this organ. It feels like an irregular marble body "wrapped up in wash leather" and tuberculated; it gradually but very slowly progresses, in comparison with melanoid growth, and the pain is *lancinating*, in the former. The spermatic chord becomes enlarged, and tubercles of various sizes are produced upon it. The testicle is liable to a slow enlargement termed the *cystic sarcoma* containing watery cysts. It does not yield to surgical treatment, and therefore may from its bulk and inconvenience require to be extirpated: though not necessarily of a truly malignant character, it may degenerate into such.

Castration is frequently requisite for all these malignant forms of disease but too much attention cannot be paid to the state of the internal organs, to the spermatic chord and inguinal glands, for it is only at an early period, when the lymphatic system is uninvolved when the tumor is yet latent before the induration and knotted appearance of the chord has taken place, that any hope of a successful operation can be indulged.

V. *Neuralgia* of the testicle is an affection of a formidable nature. The part is so exceedingly tender that the patient cannot endure the slightest exercise.

He shudders at the slightest touch and complains of excruciating pain which will continue for hours afterwards. The pain extends up the spermatic chord to

the loins, extending along the nerves of the thigh. The complaint was first accurately described by Sir Astley Cooper, who has had occasion to extirpate the testicle on three occasions for this distressing disease, which totally incapacitates the sufferer from the duties or comforts of life. The old "carbonate of iron" has often produced a cure in this (as in irritable breast) and other neuralgic affections. Various local applications have been tried as well as the internal administration of other medicines, but they do not always produce a good result. I have not witnessed the affection myself. Mr. Wardrop has proposed cutting down upon the spermatic nerves and dividing them. Lizars recommends that the disease should be treated with blisters, and setons in the integuments over the testis, with attention to the stomach and bowels, by a blue pill once a week, and a little Gregory's powder morning and evening, followed by quinine or carbonate of iron, regulating the diet, rest, and warm clothing.

If this treatment fail, extirpation is indispensable; but it should be remembered, that no sooner is the one testis removed, than the other becomes affected, and that the melancholy patient often attempts suicide.

The operation of *castration* is performed in the following manner. The testicle is grasped with the left hand: the patient being placed in the horizontal position, an incision is then made a little above the external inguinal ring and carried downwards.—On reaching the tumor the knife is carried to one side, and an incision

with a very slight elliptical curve is formed, a similar incision should be made to meet this on the opposite side ; so as by removing all superfluous integuments, no loose portion may remain as a lodgement for matter afterwards, preventing the healing of the wound. This incisions cannot be too rapid, and should extend through the whole of the coverings of the testicle. The upper part of the chord should now be laid bare and isolated, and where sufficiently detached should be laid hold of with a pair of dissecting forceps, or by passing a ligature through, it should then be divided right across, great care being taken not to lose the hold of the upper portion, lest it should retract into the abdomen. The inferior portion of the chord is now laid hold of by the operator and the dissection continued downwards and the diseased mass rapidly separated from its attachments. The arteries of the spermatic chord, generally two in number, are now to be pulled out with a pair of forceps and tied, taking care not to include any of the surrounding parts. Should the spermatic chord have retracted into the abdomen, which is not likely in the hands of a careful assistant, it will be necessary for the surgeon to slit up the abdominal ring, and pull down the artery by means of a hook.

The diseased structure having been dissected out, the wound is to be sponged and divested of coagula, and all bleeding vessels secured which are often numerous. It is not advisable to close the lower portion of the wound which should be filled with lint or char-

pie until all risk of hæmorrhage has passed, the parts should be kept constantly wet with cold water for 10 hours, for the vessels of the serotum are very liable to produce after hæmorrhage so soon as re-action has occurred. The upper portion of the incision being in the most favorable condition, will generally unite by adhesion, and the lower by granulation. Attempts to promote union of the entire scrotal wound are inexpedient, and seldom effectual; and, in event of hæmorrhage, the pain of detaching sutures and separating the wound is exceedingly distressing to the patient, moreover blood is apt to be confined, and to accumulate in the cavity, infiltrating the cellular tissue, and terminating in unhealthy suppuration. It is therefore preferable to attempt to heal the lower portion of the wound by granulation only, one or two stiches may be applied to the superior portion of the wound.

Infiltration of the cellular tissue over the chord is liable to occur extending upwards under the superficial fascia of the abdomen with discoloration of the integuments diffused doughy swelling and much irritation of the system. The matter soon collects at one or more points. Early incision will check the advancement of this affection, followed by fomentation and poultice, and attention to the constitution. Collections of matter should never be waited for, and when dépôts have formed, a free and dependent opening should be made early. Sometimes the patient may perish exhausted by the profuse discharge and the disturbance of the sys-

tem in cases that have been neglected, or in which infiltration is rapid and extensive, and the vital powers weak.*

VI. *Hydrocele*.—Preternatural effusion from the exhalents of the tunica vaginalis of the testicle and spermatic chord is extremely frequent, especially in the humid and warm climate of Bengal under the designation of hydrocele of the tunica vaginalis, and hydrocele of the spermatic chord.

Definition and seats of hydrocele.—Hydrocele of the tunica vaginalis commences in the lower part of the scrotum, and gradually ascends towards the abdominal ring. Should the hydrocele be of long standing, the tunica vaginalis becomes elongated and yields upwards, and may be so much distended by its fluid contents as to reach along the spermatic chord as far as the abdominal ring. In ordinary cases the water is only a little above the testicle to which the serous membrane extends and naturally limits it. The effused fluid surrounds, as it were the testicle, excepting at its lower part, where it is felt at the posterior part of the scrotum about 2-3rds of the way down. This may not be always the case, as where the tunica vaginalis is much thickened or ossified, or where the testicle has become adherent from inflammation to the anterior or lateral portion of the tunic. In large cases the testicle cannot be distinctly felt. The contents are generally

* Liston.

straw colored, sometimes pale and occasionally of milky appearance, at other times dark from admixture of blood. There is no pain attending the affection.

The *causes* of hydrocele are frequently obscure. There are many circumstances which cause this inflammatory action, people who have had gonorrhœa, followed by inflammation of the testicle, are probably most liable to the disease, commencing first in the testicle which was the subject of inflammation. It is certainly unusually prevalent in Bengal where gonorrhœa is likewise exceedingly common. In many cases, however, the patients deny any previous inflammatory attacks. The balance between the exhalants and absorbents is lost. Riding or other exercise causing continued excitement would seem to induce it. There is always more or less effusion of serum in inflammation of the testicle. A varicose state of the spermatic veins has been supposed to be a cause. Hydrocele is generally found to exist with hypertrophy of the scrotum, where the veins are enormously enlarged, and impediment to the return of blood considerable,—blowing wind instruments and lifting heavy weights have in the same manner been named as causing the disease from impeded return, and therefore diminished absorption. The tunica vaginalis in old cases is generally very much thickened, and in all cases more or less so. This is particularly the case in warm climates. The layers of the membrane are sometimes rendered rigid, and almost osseous by a deposition of earthy matter. Cholesterine has

in such cases been found in the contained fluid. Membranous bands or filaments sometimes intersect the cavity, or it may be divided entirely into cavities by complete septa.

Diagnosis and symptoms.—The distinction between hernia and hydrocele may thus be stated. The latter terminates a little above the testicle, so that the spermatic chord is free. In older cases this does not apply. The enlargement is pyriform. It has a smooth uniform surface, soft and distinctly fluctuating to the touch, though this may sometimes be obscured by the thickened parietes. The testicle can generally be felt. In doubtful cases it may be prudent to examine the part with a lighted candle placed on one side of the swelling darkening the apartment to facilitate the discovery of transparency which will be often very distinctly perceived; the affected testicle should be grasped by the left hand, whilst the other hand is placed over the anterior part of the swelling, the candle being at the same time held on one side—so that on looking at the other side, we can perceive if any of the light of the candle be transmitted through the tumor. It is only in cases of doubt and obscurity however that this measure is necessary, and in cases of thickened tunica vaginalis it is no criterion. Many unfortunate operations, have frequently been undertaken from erroneous diagnosis. The weight of the tumor is comparatively very disproportionate to its bulk—the swelling is moveable—the fluid will ascend when compressed, and the swelling

increase at the upper part. Thus the chief diagnostic marks are, its lightness, mobility, freeness from pain, and the history of the case, together with its distinct fluctuation, and usual transparency, in contradistinction to the weight, flatness, pain and sickness attending diseases of the testicle itself.

Hæmatocele is sometimes mistaken for hydrocele, inasmuch as the form of the swelling in the former resembles that of the latter. But the history of the case is different. Hæmatocele or effusion of blood within the vaginal tunic originates from a blow. It occurs often in riding, the horse plunging and throwing the rider with violence against the pommel of the saddle. The patient will state that the parts were severely bruised and ecchymosed at the time of the accident.

Encysted hydrocele of the chord occurs most frequently in children. The fluid is contained in a distinct cyst of a smooth shining serous appearance internally. It is thin and clear in consistence. The cyst is sometimes an obliterated portion of the congenital spermatic process, and at others, is composed of thickened and condensed cellular tissue, strengthened exteriorly by the expansion of the cremaster muscle.

Encysted hydrocele is usually of an oval form and situated midway between the testicle and groin, though it may occasionally encroach on these and is seldom large. It causes no pain, and fluctuation can be generally, distinctly perceived. It is circumscribed, the chord both above and below being natural to sight

and touch, and not altered by change of posture, or by muscular exertion.

The *treatment* of hydrocele is either *palliative* or *radical*, the former consisting in evacuating the fluid occasionally as it may accumulate and become inconvenient to the patient, the latter in stimulating the serous surface by injections so as either to excite inflammation and adhesion of the surface of the vaginal coat ; or, which is the most usual result, to change the action and restore the healthy balance between the exhalants and absorbents. It is erroneous to suppose that the sac is generally obliterated by adhesion of the tunica vaginalis to the tunica vaginalis scroti. In children the simple evacuation of the fluid is generally effectual in eradicating the affection, or merely the application of the hydrochlorate (muriate) of ammonia, and in young and healthy constitutions, a similar result may be expected from this simple process of tapping, if followed by the adoption of measures calculated to promote absorption, and impart tone to the vessels, by the application of soap plasters or ung: hyd: c. camph: and the tight suspensory bandage or "lungote" tightly braced up, as used by the athletes. The ung: potass: hydriodat: has been used by Mr. Caswall with success,—see London Medical Gazette. By such means the advancement of the effusion may be greatly suppressed, which many infinitely prefer to the pain and inflammation necessarily attending the radical cure, and which sometimes be-

comes very severe, and injurious to the functions of the testicle.

Palliative cure may be conducted in the following manner. The swelling having been grasped with the left hand, from behind, and compressed so as to render the forepart prominent, the trocar is plunged directly through the integuments and tunica vaginalis, carefully avoiding the veins and arteries of the scrotum, and then directed obliquely upwards, withdrawing partially the stilet, so as to avoid wounding the testicle. The stilet is then entirely withdrawn, and the fluid permitted to escape, gently pressing the sac until all is evacuated. Where the hydrocele is large the operation may be more expeditiously completed by using a large trocar such as is employed for ascites. The wound immediately closes when this is withdrawn, and usually heals in a few hours.

For my own part I must prefer the palliative to the radical treatment. There is no inconvenience from the complaint. The water may be prevented from accumulating for a long period.

The *Radical* cure as it is termed is effected by the injection of wine or spirits diluted to a variety strengths with water, solution of the sulphate of zinc, or even cold water alone. In India the preference is now very generally given to a solution of the tincture of iodine in water, as recommended by Mr. Martin of Calcutta; a drachm of tincture to the ounce of distilled water will generally be found effectual. Whether the modus

operandi of the iodine is to be accounted for by its specific action on the absorbents is doubtful, for that could only be temporary; acupuncture has been recommended with a long needle flat at the point. The fluid escapes into the cellular tissue—an anasaruous hydrocele is thus substituted for an encysted one, and the fluid becomes absorbed, or the fluid, perhaps by acting as an irritant when situated between the cremaster and inguinal tunic, excites inflammation extending to the former, and so alters its secreting nature as to act as a radical cure.

Its operation is more probably explained on the same principle as the stimulants used by other surgeons. The inflammatory symptoms are the same; and in the hands of many, pure port wine very seldom fails. A tea spoonful of the solution is injected by means of a common syringe, and is allowed to remain in the cavity. Pain shooting upwards to the loins is very soon complained of. The primary effect is to occasion increase of tumefaction, from fresh effusion into the cavity of the tunica vaginalis, with inflammation and fever. The fluid, however, is absorbed in four or five days, and the inflammation subsides. The disease seldom returns. It may be requisite to employ active measures to moderate the inflammation. The patient should invariably have a suspensory bandage applied, and be confined to the recumbent posture. But should the excitement be insufficient the parts may be gently rubbed and

somewhat squeezed, and the patient be directed to walk until pain is produced.

VII. Hæmatocele, which in some respect resembles hydrocele, may occur either in the cellular tissue, or (in true hæmatocele) between the tunicæ vaginales, by rupture of a vessel in their substance, or laceration of one of their tunics, and consequent effusion of blood between them; it occurs sometimes after hydrocele, especially if the tunica vaginalis has been much thickened and its vessels varicose. It may also occur after operations for hernia from the blood of some divided artery, being infiltrated into the cellular tissue.

The effusion of blood into the cellular tissue, if proper attention be not given, may become so extensive as to occasion considerable alarm to the patient.

The symptoms of the accident in the cellular tissue of the scrotum are, a dark appearance of the scrotum with a doughy swelling. Fluctuation may be perceptible at one or more points where the cells are broken down, and much blood has accumulated.

The treatment should consist in the employment of fomentations when the parts are painful, and saline purges, supporting the parts on a soft cushion, and rest in the recumbent posture. The absorption proceeds very slowly. Where inflammatory symptoms have entirely subsided, a solution of muriate of ammonia, alum, camphorated liniment, or any other astringent and stimulating substance may be used. Where the tumor suddenly becomes painful and increased in size, indicat-

ing putrefaction of the effused blood, and suppuration, the parts should be freely incised and poulticed. The healing of the wound, can subsequently be conducted by mild and lighter dressings, but unhealthy suppuration and sloughing is very apt to supervene where this accumulation has burst, or been opened by incision.

The accident occurring in the *tunica vaginalis*, the treatment here also should be that of endeavoring to promote absorption by discutients, and if unsuccessful, making a puncture and evacuating the effused blood. The parts should not be injected, when on puncturing, a mixture of blood and serum in a hydrocele is discovered. The radical cure should be deferred until, on puncturing, the fluid is found to be altogether unmixed with blood.

VIII. Cirsocele is a varicose enlargement of the plexus pampiniformis formed by the spermatic veins at the head of the epididymis. It often occasions great uneasiness and atrophy of the testicle. It is situated at that portion of the chord which is below the abdominal ring. The tumor is somewhat pyriform, the larger extremity resting on the testicle. The veins are readily distinguishable through the integuments, pressure from below upwards during the recumbent posture diminishes the swelling, whilst pressure above impeding the return of blood to the heart increases it. There is often a dull pain in the back, which is relieved by suspending the scrotum. Cirsocele is liable to be mistaken for omental hernia. It is most liable to occur in the left side, because of the pressure of the sigmoid flexure com-

monly full of fæces in the spermatic vein at the angle at which it enters the ascending vena cava. It may attain a large size and prove a source of great uneasiness to the patient, but the castration which has been in such cases recommended can hardly be justifiable. A bag truss will usually afford considerable relief—rest, laxatives, and occasionally leeches, may be required where there is much pain or redness.

In obstinate cases obliteration of the veins may be accomplished by the application of a heated wire ; for which purpose the upper part of the tumor should be grasped and made prominent, when a red hot needle may be pushed through the veins at several points. The patient should be made to stand before the surgeon, who then examines the component parts of the chord ; he should then return to the horizontal posture, when the turgescence of the veins will subside, and the vas deferens be distinctly felt ; this is to be held by the finger and thumb of the operator's left hand, while the patient rises, and again the veins become turgid, which should now be pierced with the cautery at a black heat in one or more points.

CHAPTER V.

ON

DISEASES OF THE EYE.

SEC. I.—ON INFLAMMATORY DISEASES OF THE EYE.

Sub-section I.

I. On ophthalmic inflammation in general.—The various textures of the eye possessing both physical and vital properties peculiar to themselves, the symptoms and appearances of ophthalmia must necessarily vary according to the particular textures which may happen to be involved on the morbid action. The conjunctiva, sclerotica, cornea, iris, crystalline capsule, and retina, accordingly present very considerable modifications of inflammation, rendering the *diagnosis* of these various forms the most delicate and interesting points of pathological investigation, an error in this particular often leading to the most serious consequences. There is scarcely a coat of the eye which is not subject to its own peculiar character of inflammation, and some of them to specific forms of excited action. The muco-cutaneous conjunctiva for instance, is

often the seat of gonorrhœal inflammation, and of the ophthalmia neonatorum attended with a copious purulent secretion, the fibrous sclerotica is occasionally the seat of arthritic inflammation, the muscular, or, according to others, erectile tissue of the iris, is often attacked with inflammation of an arthritic, syphilitic, or simple character. The crystalline capsule pours out coagulable lymph from its serous surface forming morbid adhesions—the choroid, the retina, and the hyaloid membranes are each either separately, but more frequently collectively subject to morbid action leading to the serious consequences of structural disease, and the fibro-cartilaginous cornea loses its transparency and becomes the site of destructive ulceration. The various peculiarities of constitution likewise greatly modify the inflammatory affections, particularly the serofulous diathesis.

The influence of sympathy between the different textures is so great that the inflammation of one is generally more or less communicated to the others, the deep seated parts thus communicating with the superficial, and these latter conversely with the former. In general we find that internal inflammation communicates increased vascularity to that portion of the *sclerotica* contiguous to the cornea, producing a zone of vascularity, whilst the different *conjunctival* inflammations first make their appearance under the palpebræ, and at the angles and circumference of the eye, and though the complications of disease may appear intricate, we shall find them

not so much so, but that a minute knowledge of the anatomy and physiology of the eye, and attentive observation, will enable us to form a tolerably accurate diagnosis.

Accurate classifications of these varieties will greatly facilitate our correct acquaintance with them, and enable us to arrange our ideas, and form our conclusions in a more analytic and inductive manner, dissipating that vague nomenclature which is still employed on the subject, whilst we endeavour to avoid some of those endless subdivisions which are not found to exist in nature.

II. General treatment of the ophthalmia.—Previous to describing the different inflammations of the various textures of the eye, both external and internal, I proceed to offer a few rules of general application on the subject of treatment.

There are some causes which it is necessary to remove before directly attacking the inflammation, and there are others which may be attacked with success only on the decline, and sometimes during the convalescence from ophthalmia.

Any foreign body should be immediately removed which may have fallen between the eyelids, whether moveable between these and the anterior surface of the globe, or fixed in the external membranes. Inverted eyelashes are to be adjusted or extracted. The latter is especially requisite if the deviation be the result of disease of the border of the eyelids, as the case in *Tri-*

chiasis. Lime or other chemical agents falling on the cornea produce the most serious disorganization of the textures, and should be removed carefully with a camel-hair pencil. Should any particles be suspected to have remained, vinegar and water should be afterwards applied to the eye. The lids may be everted if requisite, and the eye carefully examined in all directions.

If we cannot entirely withdraw the patient from the influence of solar or artificial light, it is necessary to modify it at much as possible—absolute repose of the organ must be enjoined. Scofulous affections, chronic rheumatisms, syphilitic diseases, or others, must be opposed by certain therapeutic agents of peculiar efficacy in these diseases, but these cannot always be used without inconvenience during the inflammatory period.

Bloodletting may be general or local—the former is indicated in all acute forms of the disease, the latter is of advantage in the milder degrees of inflammation, or after general depletion, often causing the irritation, the compression and the pain to cease rapidly. General bleeding also acts as a derivative by giving another direction to the morbid flow of blood.

In order to obtain the united effects of these two depletive methods, it is well to employ them in severe ophthalmia either simultaneously or alternately, local being made to succeed general bleeding at a very short interval. It may be necessary to carry the bleeding to syncope. Arteriotomy, bleeding from the jugular vein, and from the nasal vein do not appear to possess any

peculiar advantages, and they often require the considerable inconvenience of compression in the neighbourhood of the diseased organ, which restrains the venous circulation and increases the inflammation. In many of the natives of India, especially the poorer and sedentary classes of Bengal, the powers of the system are greatly enfeebled under ophthalmic inflammation, in which cases general bleeding is altogether inadmissible and the local even must be used with caution. In many cases the system must be supported by every admissible means both of nourishment and medicine? The best local bleeding consists in the application of leeches along the brow and forehead or to the inner canthus. If placed too near the eyelids they often produce an erysipelatous œdema, and sometimes ecchymosis which is objectionable, especially in females, and prevents our examining the state of the eye. In infants however we often find much benefit is effected by the application of one leech to the middle of the upper lid. Excepting in chronic cases of inflamed and thickened conjunctiva, inconvenience results from applying leeches on the internal surface of the lids irritation being caused by the bites. In most cases scarification are preferable, snipping also across the enlarged vessels by means of forceps and seissors is sometimes advantageous.

Derivative bleedings are chiefly useful when there is a suppression of any habitual evacuation associated with the ophthalmia; as of the menses or hæ-

morrhoidal flux, or, of an epistaxis. In such cases the application of ten or fifteen leeches to the anus or genitals, or cupping upon the back, the loins, or the lower extremities, are useful.

Counter-irritation, by attracting the blood towards the circumference, is often a valuable auxiliary.

Of this character are the foot bath, with mustard sinapisms to the extremities, and the application of the emplast: resinos: cantharid: to the back of the neck, behind the ears, or between the shoulders, for the purpose of producing a temporary rubefaction of the skin. In proportion as these derivative means of a transitory action are useful, and serve to aid the effects of the other remedial measures, by so much the more energetic agents which give rise to a vesication of the skin, or which keep up for a long time a puriform secretion in the neighbourhood of the inflamed organ, appear to be injurious, and rather adapted to add a new irritation than to relieve the primitive inflammation. In the course of my experience I have rarely witnessed any salutary effects result from these violent remedies in the active periods of ocular inflammations. They possess a marked advantage only in the inflammations of the mucus textures accompanied by an abundant puriform secretion. It is still necessary, even in these cases, that the severity of the inflammation should have been modified by the previous employment of antiphlogistic measures. But we must not depreciate the value of these agents, used when the severity of the dis-

ease begins to diminish, or when it is desired to prevent a relapse in a rebellious inflammation. In most cases the application of a blister, or frietions with tartar emetic ointment composed of a drachm of tartarized antimony and four drachms of lard is sufficient, towards the decline of the inflammation to produce rapid amelioration and give to the disease a more decided progress towards a happy termination. In more protracted, complicated, and chronic cases I have found great advantage from a seton. Moxas and issues are not without their advantages in these cases; it should be remembered, however, that both setons and issues, if long continued, are liable to become habitual, and therefore incapable of making any impression on the disease; and injurious from constituting an additional and artificial morbid action, of which the patient may not be able to rid himself without great precaution, and sometimes not without serious consequences. Blisters and the tartar emetic ointment have the advantage of exciting an irritation which we can readily arrest without danger, and afterwards reproduce with renewed activity.

Purgatives act in various ways, as depletive or derivative agents. By inducing an abundant secretion from the intestinal canal they give rise to the evacuation of a large quantity of serous and fibro-albuminous matter. This kind of evacuation is not less important than sanguineous emissions, especially when the ocular inflammation attacks very young subjects, in whom the

serous and fibro-albuminous parts predominate. Purgatives are still very important when a peculiar morbid disposition as in scrofula, is the cause.

The second effect of purgatives consists in the transferring the irritation of the mucus membrane of the eye to another very extensive portion of the mucus system. This powerful and favorable revulsion is equally useful in the inflammation of all tissues of the eye.

Finally they are also useful in those cases, by no means rare in which the local inflammation is accompanied and often kept up by a gastric irritation. It is especially in practice among the poor that their employment is of great value and extensive application, on account of the bad quality of their food, which produces complications in every disease. There are cases of conjunctivitis of a mild character in which a simple purgative alone fulfils the indication of depletion, and dissipates at once all the morbid phenomena.

The usual purgatives for adults are, calomel and jalap, calomel and rhubarb, jalap and cream of tartar, the neutral salts, as the sulphates of soda and magnesia, and the aloetic purgatives where the uterus is at fault. With children manna in a dose of one or two ounces, dissolved in water, or an infusion of senna with coffee, or an electuary of senna with prunes and cream of tartar, or the syrup of rhubarb may be employed. If we desire a more drastic purgative scammony or jalap in a dose of a scruple for adults and of half a scruple for children

may be had recourse to. Calomel may be given with these in a dose of from 4 to 12 grains.

We may obtain sufficient purgative effects with the tincture of colchicum, given to children in a dose of from 4 to 12 drops, and to adults in that of from 15 to 20 drops four times a day. This remedy is useful because its taste may be so easily disguised in some mucilaginous drink, that children may be made to take it without difficulty.

Emetics, the action of which is similar to that of purgatives, are seldom required in inflammations of the eye. The depletion produced is less complete than that of purgatives. The efforts which precede and accompany the act of vomiting, have the disadvantage of causing a determination of blood towards the head, and of consequence towards the eyes. They are efficacious, however, for promoting the action of the absorbents in *chronic* cases, where the transparent media are affected. Tartarized antimony in large doses, not as an emetic, but as a counter stimulant, may be used in violent ophthalmia, according to the same rules which have been fixed for its use in inflammations of the other organs.

There are certain cases of chronic ophthalmia complicated with abdominal plethora as in strumous ophthalmia, or rheumatism, which are rapidly benefitted by the use of tartarized antimony or ipecacuanha in nauseating doses.

Alteratives.—These remedies are of essential service,

especially in the internal inflammations. Indeed without this class of medicines we should be unable to controul the mischievous effects of effused coagulable lymph which, under the administration of mercury, is so speedily absolved and the clearness of the pupil preserved.

Tonics.—The scrofulous ophthalmiæ and the chronic stages of sclerotitis are efficaciously treated by this class of measures, amongst which bark in powder or decoction, the mineral acids, and the chalybeates are the most valuable.

Narcotics, either in the form of vapour or of ointment are useful in alleviating pain, especially in the *rheumatic* and *catarrhal* forms of inflammation. Opium is employed for this purpose rubbed on the brow and forehead in the following native formula.

R. Aluminis.

Opii.

Extracti radicis Amomi

Anthorhigi (vulgo “Rusount”) sing: p: æq:

Aquæ fontanæ q: s:—

M.—singulorum partes æquales.*

This narcotic “leph,” with the administration of a purgative followed by a collyrium of alum, are often sufficient to remove the milder forms of catarrhal conjunctivitis. But the peculiar class of narcotics consisting of belladonna, hyoscyamus and stramonium, are of the greatest value from their power of dilating the pupil.

* The *rubefacient* effect of the *Amomum Anthorhigum* seems to favor the subsequent *narcotic* effect of the *Opium*.

They are employed either in solution or in the form of extracts dissolved in water and smeared over the brow and forehead. I am frequently in the habit of employing them in combination with the native formula above mentioned. Warm fomentations are also valuable auxiliaries.

Escharotic and *stimulants* are employed with the best effect in conjunctival inflammations only. Amongst these may be enumerated the *nitras argenti*, the *murias hydrargyri* in solution, and the red precipitate and sub-nitrate of mercury in the form of ointment. The *vinum opii* is likewise useful in chronic cases. As *astringents*, solutions of the nitrate of silver, alum, and the *murias hydrargyri*, are the best.

It is necessary to include in the general principles of treatment a strict attention to dietetic rules, the observance of cleanliness, the removal of morbid secretions, early hours, pure air, regulated diet—&c., the neglect of, any of these often aggravating and increasing the inflammation.

SUB-SECTION II.

Inflammation of the external tunics—general remarks. The external inflammations vary considerably in degree, from slight congestion of the *conjunctiva* to acute inflammation and chemosis of that covering, together with more or less inflammation of the *cornea* and *sclerotica*.

Where the inflammation is merely confined to the conjunctiva there is but little danger attending the affection. The loose texture of the membrane is such that its vessels readily yield, and the pain is consequently inconsiderable.

The sclerotica and cornea being of firmer texture only give way under more powerful excitement, and they yield to the distension with less facility and greater pain. Their vessels do not readily recover, so that the inflammation is with more difficulty overcome, and the implication of the cornea, with the ready communication of excited action to the iris, exposes that organ to danger. There is a close vascular connection between the scleroticæ and cornea to the iris, and the iris itself is never affected with inflammation without involving the vessels of the sclerotica.

I. Conjunctivitis of a purely local and uncomplicated kind may occur in many individuals. The glare reflected from the sea or from extensive arid sandy soils, as in the plains of Hindoostan, Arabia, Persia, and Egypt* are extremely injurious to the eye. It is also extremely common from the strong reflected light from snow amongst the Esquimaux and the inhabitants of other northern latitudes. The eye is often irritated by sudden exposure to a degree of light to which it has not been previously accustomed. Different directions of the sun's rays, and different kinds of light seem to exert

* Savery observes, that at the grand mosque at Cairo there are 8000 blind persons, and Haller terms Egypt "Cæcorum in omni tempore fœcunda nutrix."

different influences on the organ. The rays are most hurtful when they do not fall in a straight direction on the eye, but obliquely or horizontally. A strong light from the moon, and light reflected from scarlet, are also particularly injurious. Other causes of conjunctivitis will be related in the subsequent varieties of the menstrual or hæmorrhoidal discharges. Irritation during dentition, may also excite the disease. Immediate irritations however are the most frequent cause, as the lodgement of extraneous bodies on the surface of the organ—particles of sand, dust, snuff, pepper, or gunpowder, minute insects, loose or inverted eyelashes. By the presence of such substances the eye is often kept in a very irritated state for a long period. Occasionally metastasis takes place suddenly from one eye to the other. Another occasional cause of conjunctivitis is the lodgement of foreign bodies in the orbit, with or without destruction of the eye, as splinters of wood, rusty nails, straw, &c. Upon a prompt removal of the cause, the redness and discharge of tears, pain &c. sometimes subside, without inflammation having been established. Wounds and other injuries of the organ are generally followed by inflammation, but clean wounds in healthy constitutions, as in many delicate surgical operations, frequently produce little or no excitement. It has been remarked that dark eyes, bear injury or excited action better than those of a light hue.*

* Lawrence.

With these general remarks I now proceed to consider the several *varieties* of conjunctivitis.

II. Catarrhal Ophthalmia is by far the most frequent form of inflammation of the eyes in adults, and is a milder form of disease, approximating in character, though not in degree, to that of purulent ophthalmia.

Inflammation of the conjunctiva. Its distinctive character is a muco-purulent discharge from the inflamed conjunctiva covering the globe or lids, and corresponds to catarrhal inflammation of other mucus surfaces.

The *Symptoms* are generally ushered in by a sensation of stiffness and smarting. There is an increased quantity of mucous secretion from the membrane, which is redder than natural, and this its secretion is occasionally thick, opaque and puriform. The lachrymal discharge is also augmented. The pain and intolerance of light are not considerable. The redness is of a bright scarlet hue, and superficial, forming, a striking contrast with the rose or pink tint of the inflammation of the sclerotica, the proper external tunic of the eye. The redness commences at the circumference of the globe, and gradually advances towards the cornea. The lids and eyelashes are agglutinated by an increased secretion from the meibomian glands. In mild cases the redness may be confined to the eyelids. The vessels on the white of the eye are arranged in a net-work and can be moved in every direction, thus evincing their superficial character. In severe cases, chemosis

may take place to a considerable extent, so much so, that if only general treatment be employed, as blood-letting and purging, whilst local means are neglected, the cornea may lose its vitality from strangulation of its vessels, become infiltrated with pus, burst and slough, and thus vision be destroyed. The sensation as of the presence of a foreign body in the eye, which is usually experienced, is to be attributed to the irregularity of the vascular congestion and consequent irregularity of surface, and mechanical irritation on motion. This symptom accordingly subsides on removing the fullness of the vessels.

The quantity of mucous discharge varies with the degree and extent of the inflammatory action, from merely sufficient to agglutinate the lids, to a copious discharge approximating to that of mild purulent ophthalmia.

Atmospheric changes are the most frequent exciting *causes* of this affection, and are readily accounted for from the exposed state of the parts to the influence of cold and damp. Catarrhal inflammation frequently prevails epidemically, particularly during the prevalence of cold wet weather at particular seasons of the year, and is sometimes connected or complicated with inflammation of the mucous membrane of the air passages. Soldiers on watch or in camp exposed to heavy dews are frequently attacked with this ophthalmia.

Prognosis.—This inflammation is apt to remain in a

chronic form for a considerable period if neglected, causing febrile excitement and constitutional irritation, the conjunctiva lining the lids becoming granular, thus forming a source of irritation to the cornea and leading to its opacity.

Diagnosis.—This form of disorder is readily distinguished by the diurnal remission and nocturnal exacerbation of the symptoms, by the absence of pain and intolerance of light, by the superficial character of the inflammation. This is distinguished from the distinctly purulent ophthalmia by the comparative mildness of the symptoms.

Treatment.—*Local stimulants* are the most effectual remedies in this disease ; a brisk purgative may be administered at the onset, but general antiphlogistic measures are seldom requisite. Blisters to the back of the neck may be required. In severe cases a drop of the solution of nitrate of silver of from two to four grains to the ounce should be dropped on the eye ball once a day ; a chemical decomposition takes place on the solution touching the eye, and the silver is precipitated over the eye in the state of a muriate. The eyes may be fomented in the interim.

b. Catarrhal inflammation of the lids (ophthalmia tarsi) commences generally at the angles, and extends along its margin. It originates from atmospheric changes, any irritation applied to the ciliary margin in persons of fair skin and delicate fibre, from unhealthy atmosphere, especially where the health is broken up, or

impaired, from any cause of continued operation. In the unhealthy confined cities of India it is by no means uncommon, especially amongst the females of zunanas. The plumbago (Soorma) which they are in the habit of applying to improve the expression of the eye may have something to do with this, aided sometimes by neglect of cleanliness; it commences with soreness, smarting and burning; it is increased by employment of the eye, as in reading and writing. There is a mucous discharge, with itching, and the meibomian glands participate in the irritation. Their secretion is increased and becomes viscid, so that the lids are agglutinated, and opened with difficulty, especially after sleep. The viscid matter adhering to the cornea obscures vision, and causes the sensation of rings haloes, and irides, appearing round the flame of a candle. The ciliary margins become actually raw, as the disease increases, and even ulcerated, particularly towards the lower lid, and especially at the angles. This chronic form of the complaint is termed *lippitudo*. It lasts for a long time, and is apt to recur from slight causes being followed by thickening, ectropion, and loss of the cilia.

The *treatment* must be conducted on the same principles as that of the preceding catarrhal ophthalmia. Scarifications and stimulating ointment of the nitrate of mercury, or red precipitate, will be especially requisite, unctuous applications at night, warm fomentations in the morning, derivatives—collyria of the sub-borate

of soda, acetate of lead, or sulphate of zinc, will be of advantage during the day. Ulcers should be treated with lunar caustic, and the lashes should be extracted. Constitutional treatment consisting of alteratives, tonics, the warm bath, pure air and cleanliness, with attention to diet will be requisite.

III. Purulent ophthalmia is characterized by the secretion of muco-purulent matter from the inflamed vessels of the conjunctiva. It is merely a morbid alteration of the natural secretion of the part, analogous to that which is effused from other mucous surfaces, as the lining of the urethra in gonorrhœa, or the schneiderian membrane in catarrh.

It most frequently occurs in warm climates, and possesses all the characteristics of pus. It commences generally in the underlid, accompanied with the feeling of sand lodged in the eye and some degree of stiffness of the organ, a little white mucus is first perceived on the conjunctiva. The inflammation even extends to the globe, and it is now marked by a high degree of vascular action. There is profuse discharge. There is considerable tumefaction, occasioned by the effusion of serum into the cellular tissue under the conjunctiva. In consequence of this effusion, the eyelids are inverted. The conjunctival covering of the eye itself participates in the affection with extensive serous effusion (chemosis) often overlapping the circumference of the cornea, and even concealing the latter from view. The eye in some instances, becomes the seat of lancinating pain, its coats

give way, and its contents are discharged, it then collapses with immediate relief to the patient. On other occasions destructive ulceration and sloughing of the cornea takes place from strangulation of its vessels, and bursts, attended with relief, and temporary return of vision. But the hopes of the patient are but too speedily disappointed by the subsequent *staphyloma* and destructive progress of the disease. The humors of the eye often escape, and the globe becomes collapsed. The conjunctiva lining the palpebræ becomes granular.

The constitutional symptoms are not severe. The general circulation participates but little, the tongue is not much altered, nor the appetite impaired. It is scarcely possible to distinguish the state of the cornea, from the great tumefaction of the palpebræ and conjunctiva.

The palpebræ in the advanced stages of the disease become everted from the subsidence of the œdema, and from the swelling of the conjunctiva being no longer counterbalanced. This membrane is at first villous, and of a dusky color, relaxed, and its vessels enlarged and loaded; subsequently in its chronic state, it becomes hard and ulcerated, and the puriform fluid continues to be discharged for a long time.

The contagious character of the complaint does not in the opinion of some writers admit of doubt. Dr. Vetch, Mr. Macgregor, Dr. Edmondstone, Von Graafe Walther and many others are contagionists with respect to the disease as it occurred in Egypt.

On the other hand the general testimony of the Natives of Egypt is against it. Herodotus who travelled there notices the great prevalence of diseases of the eye in his time, and Volney observes that in the streets of Cairo, where the disease prevails throughout the year, but is more prevalent at the vernal equinox, you may find out of 100 persons in the streets twenty blind, ten with only one eye, and twenty more whose eyes are red, purulent or covered with films, whilst by others it is considered as merely a severe form of the catarrhal ophthalmia, modified by the peculiarities of climate, the excessive cold and damp of the nights, and the intensity of the sun's rays during the day, at least such have been the opinions respecting the complaint as it prevailed in Egypt, during the presence of the British and French Armies in that country. The disease prevailed extensively in Europe after the return of those Troops from Egypt, but gradually subsided as they were separated and dispersed, and enjoyed the advantages of pure air. There was no dissemination of the complaint observable in the families or districts where the soldiers returned. It is not my purpose to enter into the voluminous debates which have been carried upon this subject, it is our duty however in a practical point of view, to act on the safe side and to proceed upon the notion that the complaint is contagious. We should accordingly prohibit the general use of sponges, utensils, linen, or any other things supposed to be capable of communicating the complaint from one per-

son to another. That the disease becomes *endemic*, frequently, from certain conditions of the atmosphere, does not, I think, admit of a doubt. We have numerous instances of such in this country. But the most remarkable instances I ever heard of are the following:—

“Dr. Edmonstone quotes a narrative of the casual development of purulent ophthalmia in an English ship of war in the West Indies. A still more remarkable example happened of late years, on board a French slave-ship, which left Africa with her crew quite healthy, and free from all affections of the eyes. During the voyage to the West Indies a severe inflammation of the eyes broke out amongst them, accompanied by puriform discharge. It made its appearance first among the slaves, and then extended to the crew, and by the time the ship arrived in the West Indies, there was barely a sufficient number of individuals who had retained their sight, to work the ship into the harbour. Here was a case in which no previous contact with persons having purulent inflammation of the eyes could be traced, and yet during the voyage an apparently genuine purulent ophthalmia made its appearance, and spread with the greatest rapidity. I think we may fairly conclude that the vitiated atmosphere which these persons breathed, the depression of spirits, the bad food, and the want of attention to cleanliness, are to be considered as sufficient to account for it.”*

* LAWRENCE'S LECTURES.

The application of *gonorrhæal* matter to the conjunctiva or metastasis from the sudden suppression of that discharge, produces a purulent ophthalmia resembling in every respect the true purulent or Egyptian ophthalmia, and requires the same principles of treatment for its cure, though it is unfortunately very seldom that the organ can be saved from the destructive ravages of this malignant form of disease.

The *treatment of purulent ophthalmia* in the adult will in general be efficacious in the early onset of the disease by the following means.

Blood should be taken from the arm in large quantity. It may be requisite to repeat the venesection and to follow it up by the application of leeches to the inner canthus, or by cupping from the temple. Scarifications of the swollen sclerotic conjunctiva may be also very advantageously employed carrying the incisions to the very margin of the cornea. These incisions should be carried in a direction corresponding to the intervals between the insertions of the recti muscles, so, that the principal vessels of the sclerotic conjunctiva may not be injured.

Purgatives.—These should be freely administered and the patient should be kept in a state of partial nausea and diaphoresis, by the administration of tartar emetic. Cold or tepid washes may be employed, these means should be persevered in until the œdematous state of the lids, and chemosis are reduced, and the pain abated, and they may be very advantageously fol-

lowed up by the application of a blister to the nape of the neck. This condition will be followed by relaxation. The treatment must now be changed and *astringents* applied. The general health must be supported by the administration of tonics, consisting of the sulphate of quinine and the dilute sulphuric acid.

The astringents should consist of the sulphate of alum nitrate of silver or sulphate of copper. The alum should be preferred from 5 to 10 grains to the ounce of distilled rose water. This should be frequently applied to the part, and the solution of nitrate of silver may at the same time be dropped once or twice a day into the eye, 4 grains to the ounce, gradually increasing it to 10 grains. These may be substituted if necessary by the sulphate of copper; of from 6 to 8 grains in the ounce. The unguentum hydrargyri nitratis, diluted with six parts of simple cerate, should be applied at night to the edges of the palpebræ. The strength of the applications must be gradually increased, and persevered in until the palpebræ have regained their natural state. They will be found to repress the exuberant granulations which may be forming on the conjunctiva and to promote the contraction of the dilated vessels. It is necessary carefully to watch the effect of stimulants in the first instance. They will be found to produce pain at the commencement, but this subsides, and the relaxation of all the tissues become diminished, and their dormant actions in the advanced stages become stimulated to a more healthy

state of excitement. But if the pain and redness should not subside on their use, we ought to discontinue them and return to the antiphlogistic plan of treatment.

The ung : hydr : nitr : dilut : or the nitrate of silver in substance, will be found advantageous in reducing the granulated state of the conjunctiva. In very rare instances it may be requisite to remove more or less of the diseased membrane. This may be effected by the knife or scissors, after which the bleeding should be encouraged. Sloughing of the cornea or spreading ulceration, attended with debility, ought to be met by quinine and other tonics, and supporting the system with wine and nourishing diet. Where there is evident atony, and subsidence of inflammation and ulceration spreading deeply in the cornea, it will often be advisable to suspend the stimulating collyria, and leave the case to the restorative powers of nature, aided by the use of the tonics and stimulants.

It has been advocated by some to commence the treatment at once by tonics, but the method is hazardous. The stimulant treatment will be earliest indicated in the natives of India, though at the onset depletion should not be omitted.

As palliatives to relieve the circum-orbital pain, the head and temples should be rubbed with laudanum, or the steam of hot water and laudanum may be allowed to rise into the eyes from a teacup ; or the native "l p,h" formerly alluded to may be applied to the brow, forehead, and temple.

The same treatment in every respect is applicable to gonorrhœal ophthalmia.

IV. Ophthalmia neonatorum, as it is termed, is by no means an unusual form of purulent disease, originating usually from the application of gonorrhœal or leucorrhœal matter to the eyes of echildren during parturition. A milder form of the disease arises from the injudicious exposure of the eyes of new born children to a powerful light, instead of gradually accustoming the organ to its stimulus. It is accompanied with a very unhealthy state of the constitution; the scalp and other parts of the body are frequently covered with eruptions.

The disease generally manifests its first symptoms by the appearance of redness and turgidity of the vessels of the conjunctival lining of the palpebræ, a great degree of tumefaction soon supervenes, rendering the separation of the lids extremely difficult. They occasionally become everted during the crying of the child, owing to the sudden and forcible contraction of the strong external fibres of the orbicularis muscle. This eversion most frequently subsides from the cessation of its immediate cause, but in some instances it remains, if the internally projecting tumor of the conjunctiva is permitted to become still more tumefied from strangulation, caused by the outer margin of the reflected lid. The inflammation extends over the globe of the eye, bulges out the eyelids, and turns their margins inwards. The secretion of puriform matter is copious, and from

the neglect of cleanliness, the secretion from the meibomean glands becomes so adherent as to close the lids, and prevent the escape of the purulent accumulation. The adhesion is such as to cause great difficulty in separating them, and when separated, the matter gushes out in great quantity. This accumulation is an additional source of irritation, and increases the inflammation, which involves the cornea. Whitish specks form on it, and it ulcerates. The ulceration extends into the anterior chamber; or portions of the cornea slough, followed by evacuation of the aqueous humour, and flaccidity of the cornea. Another consequence though a more remote one is, that the cornea often becomes opaque, changed in texture, and increased in thickness, so as to form a convex projection from betwixt the eyelids, termed *staphyloma*. The sclerotic coat also is sometimes affected in a similar manner. Adhesion of the iris to the ulcerated cornea is another consequence. These various diseased changes occur very quickly, and run their destructive course rapidly, as we might, *a priori*, expect, from the great activity of the capillary circulation in infants, and the very severe character of the inflammation.

If by incautiously attempting to open the eyelids of children labouring under the complaint, by merely raising the skin only of the upper, we shall cause eversion by the action of the orbicularis. It is necessary to push the tarsus itself upwards and backwards, by which the accident will be prevented. Should the

accident have occurred, the eversion is readily removed by pulling the tarsus gently downwards. The proper period for examining the eyes of children is when they are asleep, or, if awake, by watching a tranquil moment, when the child is unconseious. When the orbicularis is once set into action by the child it is impossible to obtain a sight of the cornea, and the attempt should not be made.

In the third stage of the complaint there is a gradual abatement of the symptoms, and the eyelids are more readily opened, but it is only to exhibit the serious mischief which has resulted. Ulcers of the cornea, whilst spreading, are of a dusky white or yellowish color, irregular on their surface, and often with a ragged edge; when they begin to heal they have a greyish, or bluish aspect, become smoother, have a soft gelatinous appearance from deposition of the substance which is to repair the breach, and red vessels pass to them from the conjunctiva through the intervening transparent portion of the cornea. These heal, leaving a permanent opaque cicatrix; and this opacity will be of more or less importance as it is situated in front of the pupil, or at a distance from it.

Interstitial deposition into the texture of the cornea leaves permanent opacity of various extent and density. *Albugo* is the term applied to the more diffused opacity, and *leucoma* to a more partial and circumscribed, being the result of cicatrization. When it is dense, and when consequently the cornea has been inflamed

throughout, the inflammation will readily pass to the iris : that two inflamed parts brought into contract should adhere might be expected. This preternatural connexion is technically called *synechia anterior*. No doubt in these cases the surfaces containing the aqueous humour are generally inflamed, and then it is not uncommon to find a central opaque spot on the capsule of the lens, with the leucoma and *synechia anterior* : such an opacity may, however, be produced without the two other changes. In milder cases none of these consequences are produced ; the tumefaction of the conjunctiva gradually subsides ; the discharge is lessened ; but it continues of a paler color for some length of time, and the conjunctiva slowly returns to its healthy state.

When the complaint is severe, the infants suffer constitutionally, they become restless and debilitated, the tongue is white, and the bowels are irregular in the active stage. They become pale and feeble where sloughing has occurred.

Both eyes are usually affected, but it does not commence in both at the same time ; there is generally an interval of a few days.

The *prognosis* of this disease is peculiarly favourable in the early stages, and even in the advanced stages where the cornea is still clear, under judicious treatment, but of course when the more serious injuries to the cornea have occurred, the loss of vision is inevitable ; indeed it is lamentable to reflect on the

numerous instances of the total loss of vision from neglect of parents in the first instance. General superficial opacity from thickening of the corneal conjunctiva will disappear.

In the early stage an astringent collyrium of alum will frequently cure the disease. In more advanced cases it will generally be requisite to abstract blood, by means of leeches applied to the inflamed and tumefied palpebræ. One to each lid in plethoric children, and one leech only in more delicate children to the upper lid. The vascularity of the capillaries of the skin being so great, a considerable quantity of blood can readily be evacuated by this means. The antiphlogistic treatment should be early followed by the application of astringents. The eye should be frequently bathed, in the first instance, with tepid milk and water, and some unctuous application ought to be applied along the edge of the tarsus, with a view to prevent the agglutination of the lids. A laxative should be administered.

The astringents should consist of a solution of alum in rose water, in the proportion of 4 grains to the ounce, gradually increasing the strength to ten grains. The nature of the stimulus may be afterwards varied, substituting the sulphate of copper or the nitrate of silver. These fluids should be injected on the surface of the eyeball three or four times a day. Another good form of astringent solution is an ounce of distilled water containing 4 grains of sulphate of copper

to six of nitrate of silver, applied with a camel's hair pencil once or twice a day, after the eyes have been well washed by the injection of a weak solution of the corrosive sublimate. (Hydrargyri bichloridum.)

It will often be requisite to support the strength of the child by tonics in the advanced stages of the affection, especially where ulceration or sloughing of the cornea has taken place. The extract of bark in doses of from 3 to 5 grains dissolved in milk will be found very beneficial.

A discharge from the back of the ears by the application of cantharides plaster spread on a piece of candle-wick will often prove advantageous in the advanced stages. Should the disease prove protracted it will also be advantageous to administer minute doses of calomel daily, and the vinum opii may be tried externally, at intervals changed for a lukewarm solution of the bichlorid of mercury one grain to eight ounces of water. This may be conveniently done by means of a syringe, but in milder cases by dipping a linen rag in the solution and applying it to the eyes. A small quantity of the citrine, or of the red precipitate ointment, should be applied to the lids at bed-time, gently melted over the flame of a candle ; and varying the strength according to the sensations of the patient.

A granular condition of the conjunctiva should be treated by scarifications, and subsequently by the application of the solid sulphate of copper.

The ointment of Janin recommended by Scarpa consists of the following ingredients.

Armenian bole	} āāz ij
Tutty		
White precipitate	 3j
Lard	 3ss

The active ingredient in the golden ointment (Singleton's) is stated by Dr. Paris to be orpiment (*auripigmentum, sulphuret of arsenic*). These stimulants are also useful, applied between the palpebræ.

The red precipitate is made by carefully levigating 12 grains of red precipitate with an ounce of butter or soft cerate.

The eye need only be protected from strong light. A light shade may be worn. The accession of cool air is agreeable to the feelings of the patient, and is not therefore objectionable.

V. Scrofulous ophthalmia is characterised by very peculiar symptoms, dependant on peculiarities of constitution. It is frequently the first manifestation of a strumous diathesis which modifies the character of ophthalmia in a remarkable manner. There is great intolerance of light, though there is only slight redness, the sympathetic sensibility of the retina being quite disproportionate. Pimples and pustules appear on the conjunctiva, and specks on the cornea.

The *symptoms* first manifest themselves by increased redness in patches; the distended vessels are in fasciculi, and these fasciculi generally terminate in a

small phlyctenula or minute pustule, either over the margin of the cornea, or at the junction of the cornea with the sclerotica, or several of these may be scattered over the sclerotica and cornea. They may become absorbed, and leave slight opacity (*albugo*), the effect of some effusion of coagulable lymph; or a small dimple may be left in the cornea, which fills up slowly; or there may remain a vascular speck. But they more frequently burst and ulcerate, producing serious results, affecting the transparency of the centre of vision. These ulcers sometimes extend deeply into the cornea, causing *prolapsus iridis* and adhesion, and the cornea when cicatrized leaves a permanent opacity (*leucoma*). The texture of the cornea may become thickened and opaque, and its layers yield and become *staphylomatous*. In protracted cases the sclerotic yields to the pressure of the contained fluids, or the eye itself may enlarge (*hydrophthalmia*) from an increase of the internal humours. The intolerance of light is so great that the lids are spasmodically closed by the orbicularis, the brows are contracted, the alæ of the nose drawn upwards, and the whole of the muscles of the face brought into action. The child holds down its head, and seeks the darkest part of the room. There is a copious flow of acrid scalding tears which excoriate the integuments. The flow of tears is especially augmented on exposure to the light. Pustules and incrustations form on the surface of the contiguous integuments of the cheek, sometimes extending to the fore-

head and temples, and, in the worst forms, even over the body. The affection occurs only in children and is termed *crusta lactea*. It is designated by Dr. Willan as *porrigo larvalis*, from its coating the face like a mask. Other manifestations of the strumous diathesis are often present at the same time. The Schneiderian membrane is swollen, the ears excoriated, the absorbent glands of the neck enlarged, or the upper lip tumefied.

There is usually a remission of the symptoms towards night, the child being able to move about after sun set, and expose the eye without pain and it often quits the patient at the age of puberty. The disease is apt to continue for years, alternately diminishing and then relapsing or alternating with eruptions and other symptoms. These symptoms are readily aggravated, by any circumstances deranging the healthy functions of the *stomach* and bowels. There is generally a foul tongue, foetid breath, tumid abdomen, an unhealthy condition of skin, and other symptoms of general derangement. We frequently find the complaint combined with *ophthalmia tarsi*; and there is often considerable general debility.

Apthous inflammation is treated of by some authors as a distinct form of disease. It may indeed arise from a great variety of exciting causes, and may appear without that peculiar symptom of strumous ophthalmia, viz. intolerance of light. We usually find it occurring in weakly children, and in constitutions which have

suffered from various causes of debility, but it is most frequently seen in persons of a strumous and cachectic habit. Its principles of treatment differ in no essential particular from that of *strumous* ophthalmia, with phlyctenulæ and I cannot see the advantage of treating of it as a distinct variety of disease.

Causes of scrofulous ophthalmia, predisposing.—Besides that peculiarity of constitution predisposing to the disease, there are various remote causes which frequently operate in its production. Unwholesome food, impure air, deficient exercise and clothing, have a very considerable influence, as well as a variable climate; hence its great frequency in the crowded and narrow streets of large cities in the Western Provinces of India.

Exciting.—Measles, scarlet fever, and the small-pox, hooping cough, or in short any cause producing temporary debility frequently rouse into activity the scrofulous diathesis.

In the *treatment* of strumous ophthalmia it is necessary to bear in mind the constitutional nature of the disease. There are few remedies which possess equal powers of a sedative kind, as tartar emetic, given so as to cause either vomiting, or in smaller quantities, to produce nausea. It may also be given in combination with a purgative. The treatment should generally be commenced with an emetic, and where there is considerable acceleration of the pulse, the nauseating doses may be administered. Purgatives will be found of

essential benefit, especially where there is a loaded state of the primæ viæ. They should be of the tonic kind, and combined with mercurials. *Tonics*, and especially the sulphate of quinine, are quite indispensable, after the employment of the preceding remedies. The sulphate of quinine will be found to awaken the energies of the system in promoting the absorption of the pustules, and hastening the cicatrization of the ulcers of the cornea. Rhubarb, carbonate of soda, the precipitated carbonate of iron, and the tartrate of potass and iron are also useful. The mineral acids, and especially the sulphuric, will also be found advantageous. The healthy action of the skin should be favored by the employment of the warm bath, which may be substituted by the cold bath, when the inflammatory symptoms have subsided. Calomel administered as an alterative in combination with opium will be found of decided benefit after the use of evacuants.

The regulation of the diet is of great importance both with respect to the quality, quantity, and time of receiving food. A rather spare diet will be requisite during the active stage. After which, nutritious food should be allowed, such as beer, meat, milk, eggs, bread and other farinaceous articles of diet. Change of air, and to the sea side where the intolerance of light is mitigated should be particularly insisted on.

With respect to LOCAL applications, warm *fomentations* will be found to alleviate the intolerance of light, and lachrymation. The eye may be exposed to the va-

por of laudanum and warm water, and warm poultices during the night, made of bread, warm water, sugar of lead, and a little butter are useful. *Scarifications* of the conjunctiva palpebrarum, especially in chronic cases, will be found a valuable means of cure; and the vascular fasciculi ought likewise to be divided, when running over the sclerotica to the albugo on the cornea. Blisters, after the necessary evacuants, are very serviceable often giving decided relief to the photophobia or intolerance of light. They should be applied to the back of the neck or behind the ears.

Local stimulants are most valuable applications in the cure of this disease, as soon as inflammatory excitement has been subdued. The solution of the nitrate of silver, the vinum opii, and the red precipitate salve, 4 grains of nitrate of silver to the ounce of water is of sufficiently stimulant power. The fluid should be dropped on the eye when fairly exposed, the child being secured in the horizontal posture for that purpose. It expedites the absorption of pustules, the cicatrization of ulcers, and the clearing of specks, and diminishes the intolerance of light, and epiphora. Ulceration of the cornea should be treated with a stronger solution of the nitrate of silver, applied with the point of a camel-hair pencil, without permitting the solution to spread over the rest of the eye. The solid caustic scraped to a fine point will be requisite to be applied lighting every second or third day to any ulcer which may have penetrated deeply, or actually perforated into the anterior chamber,

and in all cases of central ulcer of the cornea with pro-lapsus iridis, it is absolutely necessary to keep the pupil under the influence of belladonna.

The crusta lactea may be treated by the ung : hydr : nitrat : 3j ad 3ix cerat : cetac : or a slightly stimulating lotion, of the oxyde of zinc or of the corrosive sublimate, and the surface should be frequently cleansed by ablution with tepid water.

VI. *Variolous ophthalmia*.—In all the exanthematous diseases, the eye participates in the inflammatory affection of the skin. This circumstance is readily understood from the analogies which exist between the common integuments of the body and the conjunctiva. Indeed the latter may be considered to be a continuation of the former. The tendency of the conjunctiva to put on similar diseased action with the skin is not only exhibited in these diseases, but is also evident in the scrofulous ophthalmia previously treated of, where the phlyctenula and pustules affecting the conjunctival covering of the eye generally, are often connected with the pustular eruption on the skin termed crusta lactea and porrigo larvalis. This analogy is further manifest in the conjunctival covering participating in the color of the skin in Asiatics and other dark races. This is observed in them to be of a dull, muddy hue, or of a partial copper color, gradually shaded off around the cornea. The separation of the surface of the eye with the epidermis generally, in the annual renewal of that covering in serpents, chamelions, and other reptiles, and the actual

growth of hair from this membrane in the *lemui*, or *mustyphlus*, are further striking points of analogy. Venereal ulcerations occur on the tarsal surface of the lids and the latter part is sometimes occupied by small pustules in the papular venereal eruption.

Owing to this continuity of surface, we find that various parts of the apparatus of vision share in the ravages of smallpox. Inflammation of the lids of the eye, and of the lachrymal passages take place during the active period of the disease. Pustules form on the external surface and the margins of the palpebræ, and matter is often discharged in increased quantity from the meibomian follicles causing the lids to be closed so that the patient cannot open them for days. But the most dangerous consequence is the formation of a variolous pustule upon the cornea, followed by suppuration and sloughing, leading to some or all of those serious consequences impairing or destroying vision. Evacuation of the humours, collapse of the globe, *staphyloma*, *prolapsus iridis*, *synechia anterior*, contracted or closed pupil, and *opacities* of various degrees.

An important point of diagnosis, when the lids are tumefied and closed, and the eye itself cannot be inspected is to ascertain its state by the symptoms. If the patient complains of pain in the eye ball, dryness, stiffness, a sensation of sand, with intolerance of light and considerable lachrymation, we must conclude the eye itself to be in great danger. The ab-

sence of these will indicate that the affection is limited to the lids.

Although the eye should not have been affected during the eruption, a *secondary variolous ophthalmia* often comes on after the desiccation of the pustules, and the scabs have fallen off, one or more variolous pustules form on the cornea, attended with the circumstances before described, but in a milder degree, and the consequences are not so dangerous to the organ.

Treatment.—A moderate temperature, tepid ablution and a cool regimen, together with all those general measures best adapted for small pox are of advantage in this affection of the eye. Emetics are occasionally useful, and laxatives. Bloodletting cautiously employed may be requisite. The edges of the lids should be kept smeared with cold cream. Leeches, and sometimes blisters may be required. About the eighth or ninth day of the eruption, free purging will be found useful, not merely in reducing the suppurative fever, but in relieving the uneasy and inflamed state of the eyes. Gently stimulating solutions of nitrate of silver or the vinum opii diluted should be applied to the eye, as soon as the lids begin to be opened.

Tartar emetic so as to produce catharsis will be found to diminish inflammation in the *secondary variolous ophthalmia*, and will promote the absorption of the pustules, and that interstitial abscess between the laminae of the cornea termed *onyx* or any other unfavorable consequence on the cornea. Mild antiphlogistic

measures will also be useful. Local stimulants and belladonna will be indicated as soon as the local inflammation has become somewhat mitigated.

It is needless to dwell on those forms of ophthalmia treated of by continental authors at length, which are connected with *measles*, *scarlatina* or *erysipelas*,—they manifest no peculiar symptoms with the exception of the latter, which is attended with considerable œdema in the sub-conjunctival cellular tissue ; and their treatment is regulated on general principles applicable to inflammation, and to those particular forms of disease of the skin. *Catarrho-rheumatic* inflammation is another variety enumerated by authors, it is nothing more than an active external inflammation embracing the mucous and fibrous coats of the eye, and requiring the treatment to be regulated on general principles.

VII. Granular conjunctiva has been noticed as a concomitant or sequel of the foregoing varieties. It consists in an enlargement of the acini of the meibomian follicles, and is a frequent source of mechanical irritation to the cornea, more especially where it affects the upper lid. In chronic and neglected cases a plexus of red conjunctival vessels is seen to pass down from the circumference of the globe, overshooting the margin of the cornea. A sort of vesicular inflammation pervades the cornea, these vesicles burst and leave a scabrous appearance. Numerous minute vessels carrying red blood are seen ramifying over the cornea, which becomes *nebulous* ; and in neglected cases perfectly opaque.

The treatment.—If active inflammation is present it will be necessary to apply leeches, to cup, and to purge the patient, and to scarify the conjunctiva of the lids. In chronic cases, scarification of the lids, the application of astringents, and escharotics will be indicated, and in protracted cases counter irritants.

In very obstinate cases the lunar caustic pencil should be applied in the following manner. The lid being well everted, its conjunctival surface should be dried with a piece of linen. The lunar caustic should then be brought rapidly in contact with the prominences which we wish to remove. The lid should again be dried by the linen cloth, some unirritating ointment must then be applied. This is wiped off, and the ointment re-applied, then all danger of the escharotic falling in contact with the globe of the eye is obviated. It will be of advantage to change the escharotic for the sulphate of copper.

The scarifications and escharotics are to be used alternately every two or three days.

In some cases it is necessary to excise the indurated granules by means of a pair of curved scissors.

The best astringent is the solution of the nitrate of silver from 2 to 4 grains to the ounce.

VIII. Sclerotitis, general remarks.—It rarely happens that the sclerotic is alone the seat of disease, for the cornea, iris and choroid usually become affected also. It may occur as a consequence of conjunctivitis.

“Branches from the straight vessels of the conjunc-

tiva penetrate the sclerotica obliquely towards the margin of the cornea, and the long ciliary vessels pass in sulci of this membrane to the plexus ciliaris at the root of the iris. At the interior border of the sclerotica, where the annulus ciliaris is adhering closely to this tunic, the ciliary communicate with the muscular branches, and being in deep-seated inflammation fully injected with red blood, the condensation of colour gives the well known and remarkable appearance of a vascular zone at the margin of the cornea. Injections do not demonstrate this anastomosis; for the communicating vessels, like those which are continued upon the cornea, are too delicate to admit of artificial injection, and only admit red blood after a strong and steadily supported inflammatory action.* When once they have received red blood they very slowly recover their healthy calibre, as is proved by the faint appearance of the zone long after the inflammation has ceased, and the almost instantaneous reproduction of the state of congestion on forcibly separating the lids. When an inflammation at first affecting only the conjunctiva is allowed to progress, the ciliary vessels partake of the action, and this sign of the extension of it to the interior tunics makes its appearance. But the sclerotica from its situation and texture serves as a shield to the inner tunics, from external inflammation as well as from external violence. By the interposition of the

* A very successful injection of an eye in the state of acute iritis, could alone demonstrate this fact to the entire satisfaction of anatomists.

sclerotica the vascular communication of the choroid and conjunctiva is rendered extremely minute and anastomotie; and for this reason inflammation of the conjunctiva may and often does reach to a considerable height, without any indication of its extending to the parts beneath the sclerotica. An acute and obstinate inflammation of the conjunctiva, not threatening injury to the cornea, as the pustular, and that with puriform discharge, does not in any degree affect the choroid and iris. On the other hand, when inflammation has extended to these tunics the vision is affected in a much greater degree than appearances would often lead us to expect."* It is only meant to remark that if the transmission of blood to the deeper seated tunics had followed readily to that of the conjunctiva, the consequences of every severe superficial ophthalmia would have been mischievous.

In sclerotic inflammation the vessels are of a dark rose red and somewhat livid hue, owing to their being seen through the conjunctiva, by which these are enveloped. This appearance forms a striking contrast with the bright scarlet appearance of the conjunctival inflammation, uniformly diffused over its surface. When the inflammation is severe, we observe a dense arrangement of vessels lying under the conjunctiva, and occupying the entire surface of the sclerotica; whilst in inflammation of the conjunctiva the vessels have a

* Travers Synopsis p. 126, 27.

superficial appearance, and where both membranes are simultaneously affected, a marked difference may be discovered between the two orders of vessels.

The pain is of a burning or aching character, and the patient complains of stiffness and a sense of dryness in the eye, accompanied sometimes with a feeling of tension and pressure. As the disease advances there is deep seated pain in the orbit, extending to the back of the head. Intolerance of light is a marked symptom of sclerotitis even from the commencement which forms a striking contrast with the mere inflammation of the conjunctiva. Such is the intolerance that the pupil becomes contracted to diminish the ingress of light. This difference is owing to the greater connection of the vessels of the sclerotica with the interior of the eye-ball, enhancing the sympathetic sensibility of the retina.

The conjunctiva participates in the inflammatory action and the cornea is of a greyish hue. The redness increases with the progress of the disease, with a proportionate exacerbation of pain and sympathetic fever. The redness of the conjunctiva extends to the palpebral lining, and the former dryness and stiffness is succeeded by increased secretion of lachrymal fluid, which communicates a scalding sensation.

Sequelæ, serious changes of structure are to be apprehended from the unchecked progress of the disease, especially in the structure of the cornea which will be considered under the head of corneitis, and its consequences,

Diagnosis and prognosis.—Inflammation of the external *proper* tunics (e. i. the sclerotica, and cornea) is distinguished by the redness being originally seated in the sclerotica, by the discharge being lachrymal, and not mucous; by the pain and intolerance of light, and by the changes occurring in the cornea, whereas in conjunctival inflammation *only* there is increased mucous discharge little or no pain nor intolerance of light, except at first, and seldom any affection of the cornea excepting in the more decided purulent forms of that affection.

IX. Rheumatic Ophthalmia, is the most usual form of inflammation of the sclerotic fibrous tissue of the eye. "Inflammation cannot pass from the surface of the eye to the interior tunics, without involving this membrane, and, as before explained, the impediment which is happily opposed to its progress, the slowness with which it is in consequence propagated, is accounted for by the texture and properties of the sclerotica, and the minuteness of the vascular communication through its medium between the conjunctiva and the choroid. The structure and properties of the sclerotica also explain why the primary scleritis is a rare disease."* It is considered by some writers to be a mere modification of the catarrhal originating from atmospherical influence, but modified by that exciting cause attacking a fibrous instead of a serous membrane. There is undoubtedly much obscurity in

* Travers p. 289.

the pathology of gout and rheumatism, but this form of inflammation is often found associated with the rheumatic and gouty diathesis, so that the joints the eyes, and the urethra may be affected with inflammation either simultaneously, alternately, or in succession. I recently witnessed a very decided instance of a tendency of similar fibrous textures to put on inflammatory action, in a major of the army. The disease is comparatively rare but its existence is well established as a variety of ophthalmia.

Its symptoms are marked by the fasciculi of sclerotic vessels advancing in radii towards the edge, and somewhat over the margin of the cornea. The redness is radiated and Zonular and situated under the conjunctiva. The conjunctiva more or less participates in the inflammation. The eye sometimes becomes in great danger. Both eyes are generally affected. The iris is apt to become implicated, and changed in color, the pupil contracted in breadth and elongated perpendicularly, and the cornea obscure; the effusion of lymph is more sparing than in the other forms of iritis, and is confined principally to the posterior chamber, leading, in protracted cases, to opacity of the crystalline capsule, but there are instances in which the rheumatic inflammation is confined to the sclerotic. Where the iris is involved in rheumatic or gouty ophthalmia there is a peculiar frothy secretion from the tarsal margins gathering along them, and pain of a

rhumatic kind is felt in the upper jaw and temple of the eye affected, with nocturnal exacerbation.

In the treatment of rheumatic ophthalmia nothing is so useful as Plummer's pill at bedtime, and gr. x. pulv. cinchon. e. sodæ. sesquicarb. gr. v. ter die. with cupping on the temple, if the pain be great. General antiphlogistic measures may be indicated, but not often. Opiate frictions may be employed, and the pupil is to be kept well dilated by the daily application of the belladonna. The bowels ought to be freely evacuated at the onset. If the symptoms are very severe it may be necessary to carry on the administration of mereury in alterative doses; but seldom will it be requisite to induce ptyalism. Colehium may be considered as a valuable auxiliary in the disease.

X. *Corneitis* in its acute form is always associated with inflammation of the sclerotic and frequently that of the iris.

The horny substance of this pellucid membrane has no vessels proper to itself. Its principal blood vessels are derived from those of the conjunctiva, but it likewise receives a trifling supply on its posterior surface from the vessels of the membrane of the aqueous humour, the vessels of the connecting cellular texture between the laminae is perhaps derived from the scleroticæ. These vessels in *chronic* inflammation become considerably enlarged, and admit red blood. They are not only capable of producing interstitial deposit, thickening suppuration, and ulceration, but they execute

the processes as perfectly and rapidly as the larger and more numerous ramifications of parts considered to be naturally more vascular.

In *acute* and general inflammation of the cornea, the hazy state of this tunie is invariably accompanied by the formation of a zone of red vessels in the sclerotica and conjunctiva around the circumference, and has been fully considered in connection with the several preceding varieties of external inflammation.

In *chronic* inflammation of the cornea the *symptoms* are as follow, viz. Enlargement of the vessels, interstitial deposition and consequent general *nebulous* opacity; (a term applied to the slightest degree of corneal obscurity as distinguished from *albugo* and *leucoma*) external redness of the eye, pain, intolerance of light, pain in the head, and feverish symptoms in the commencement, which subsequently decline. The vessels originate from deep seated trunks lying close to the sclerotic coat, and when the affection is partial the enlargement of the sclerotic trunks is also partial; but if the whole of the cornea be involved, there is a general pink redness of the sclerotica, distension of the entire vascular network under the conjunctiva, and a vascular zone round the cornea, giving origin to the vessels which ramify on that part. Sometimes there is a partial reddish elevation on the margin of the cornea, the color of which is found on minute examination to arise from a closely elouded arrangement of minute vascular ramifications. This kind of change gradually

extends over the surface of the cornea. The deposition into the corneal texture, from the increased activity of its enlarged vessels, produces a general cloudiness, at first only partially effecting its transparency, but becoming more and more opaque. The opacity is irregular, clearer portions being interspersed. Sometimes the opaque spots are of a yellow color, as though matter were deposited; perhaps there is a chronic suppuration in such cases. The surface of the cornea loses its polish, assuming a very finely granulated appearance, hence the eye appears very dull. There is frequently considerable pain and tension of the eye, and pain in the forehead and across the brow. The increased sensibility to the light is the more remarkable, inasmuch as the changes in the cornea must lessen the quantity admitted into the eye. The development and progress of the complaint are slow; it may continue for many weeks or months.

The iris often participates in the affection, the pupillary margin becoming adherent to the capsule of the lens. Dilatation of the pupil not unfrequently attends the disease in its pure state, and in many cases there is an evident tendency to amaurosis.

Inflammation of the cornea occurs frequently in strumous ophthalmia, where it is accompanied by the other symptoms of strumous inflammation. The pulse is often accelerated, the patient is restless during the night, and the skin is usually harsh and dry.

Treatment.—Considerable advantage is often derived

from the application of leeches to the neighbourhood of the eye, especially at the commencement of the disease, or when the patient complains of pain or tension of the eye and across the forehead, but care should be taken not to repeat them too frequently so as to reduce the general strength. It is likewise useful to administer emetics and purgatives as explained when treating of strumous ophthalmia. The use of tartar emetic as a sedative and alterative, in minute doses, combined with the peruvian bark, will be attended with much benefit, diaphoretics are often indicated by the unhealthy condition of the skin. The warm bath should not be omitted. Mercury carried to the extent of affecting the mouth is most efficacious in checking the inflammation and restoring the transparency of the cornea. It should be commenced after the subsidence of the acute symptoms by the preceding remedies. Under its influence the vessels will be seen to contract, and the newly deposited matter to become absorbed. The clearing of the cornea will gradually advance towards the centre. The iris participating in the affection is an additional reason for employing mercury. It is best administered in combination with opium.

The sulphate of quinine exercises a slower but equally beneficial influence in the chronic affection of the cornea, as in strumous ophthalmia generally. Colchicum, sarsaparilla, elm bark, chirayta and other vegetable alteratives have similar virtues in an inferior degree.

Local applications are not to be neglected. Warm fomentations, and exposing the eye to the vapor of warm water and laudanum give great relief. A seton to the back of the neck, issues to the temple, and blisters behind the ears, are generally essential.

After the entire subsidence of acute symptoms *stimulants* are of great efficacy. The vinum opii, and the red precipitate ointment, as well as the lunar caustic drops, are all valuable. From half a drachm to a drachm of red precipitate triturated together with an ounce of white sugar, and blown into the eye through a quill in small quantity, is another useful application.

The employment of *belladonna* is indispensable, in all cases where there is the slightest suspicion of the iris being implicated.

Evacuation of the aqueous humor, where there is any tendency to hydrophthalmia, is not unworthy of consideration.

Sequelæ of corneitis.—*Ulcers* in a healthy state are not attended by discolouration nor loss of transparency, and require minute inspection for their detection. Ill conditioned and inflamed ulcers, on the contrary, assume a very different appearance, the edge of the ulcer is ragged and the surface yellow, with more or less surrounding haze.

The *Treatment* will depend on the degree of inflammation of the surrounding textures and the state of the constitution; should vascularity of the conjunctiva and sclerotic be considerable with diffused and general

haze of the cornea, it will be necessary to employ anti-phlogistic measures either general or local, and purgatives. In cases of ill conditioned sloughing ulcer with want of power, tonics and sedatives will be indicated, and the slough should be touched with nitrate of silver from time to time, as the irritation and flow of tears indicates, carefully watching for the appearance of a white *semi-transparent haze* around the edge of the ulcer, which is the evidence of a healthy action having been established by the surrounding capillaries. The repetition of the caustic would be injurious to this process.

“ Amongst the most perfect and beautiful pathological illustrations of a natural adaptation of means to ends, the healing ulcer of the cornea perhaps one of the most striking ; for we see in these cases the mode in which nature avails herself of distant resources for the attainment of her object ; thus, when the vessels of the cornea are unable to effect the process of repair, we find that the vessels of another part are called in to their assistance ; for a plexus of conjunctival vessels will be seen passing over the fore part of the globe and over the cornea, without giving off any branches until they reach the ulcer ; to this part they are distributed, and they here pour out and organise the adhesive deposit, and thus assist in repairing the breach which ulceration has produced upon the surface of the cornea.”

The Belladonna should be daily employed in all cases of prolapsus iridis and the inflammation of the iris sub-

duced by calomel and opium. Counter irritants are useful in the chronic form of the complaints.

The other sequelæ of corneitis, viz. *onyx*, *nebula*, *albugo*, *leucoma*, *synechia anterior*, *prolapsus* or *hernia iridis*, and their appropriate treatment have already been fully considered in connection with the several external inflammations and their sequelæ, and I do not think, in a scientific point of view, that they ought to be treated of separately.

I may observe that it is stated on the authority of H. M. Griffiths, Esq. Bengal Medical Service, that the Persians are in the habit of treating *opacities of the cornea* by excising a circular portion of the conjunctiva. The operation is commenced by the insertion of eight small hooks “ into the conjunctiva, about a line from the union of the cornea with the sclerotica, quite round the cornea; the operator then raises the part of the conjunctiva by pulling these hooks towards him, and with a pair of scissors, he cuts off the portion thus raised and completely insulates the conjunctiva covering the cornea, the consequence of which is the gradual absorption of the opacity of the part affected, and the cornea recovers its transparency.”* Mr. Griffiths observes that it is said to be frequently successful, but that gentleman does not in his communication state that he had himself observed the result.

Hernia of the cornea takes place when a deep ulcer

* Trans M. P. S. Calcutta vol. viii p. xx. appendix.

extends through the laminae of the cornea, whilst the membrane of the aqueous humor lining the cornea remains entire. This delicate membrane being too weak to support the pressure from behind, bulges forwards, and sometimes assumes a conical form. It is necessary to remove it with the scissors, or destroy it by the application of the nitrate of silver, as in other cases of ulcers of this tunic.

Fistula of the cornea whether following the operation of extraction of the cataract, or the result of a penetrating ulcer, attended with a draining of the aqueous humour, or where the conjunctiva has healed over the cornea whilst the coats of the latter as still unhealed, requires the same treatment as the hernia of the cornea, snipping off the protruding conjunctiva should that exist, and gently touching the fistula with the nitrate of silver.

In *staphyloma* of the cornea whether with or without adhesion of the iris to the cornea the sufferings of the patient can only be alleviated by excision. But as it cannot restore vision, and the operation is an unsightly one, we should hesitate in performing it on natives, as it alarms the bye-standers and gives them an unfavorable impression, and thereby discourages others with more curable complaints to come to us.

SUB-SEC. III.—ON INTERNAL INFLAMMATION OF THE EYE.

I. Iritis.—The Iris being nourished by two arteries, totally unconnected with those which belong to the other textures of the eye, inflammation of its texture often exists independant of inflammation in the other membranes of this organ, as conjunctivitis, sclerotitis, or corneitis. The close connection however between the different internal parts, both nervous and vascular, are sufficient to account for the circumstance of the inflammation almost as frequently spreading from this structure to other internal membranes. Thus it is that iritis often spreads to the ciliary body, choroid coat, vitreous humour, and retina, to the anterior part of the eye, so that a case of iritis often involves in its progress the greater part or the whole of the internal tunic, and the external parts likewise. Iritis however notwithstanding this unfortunate connection and contiguity, is very generally recognized as a distinct affection. The chief danger to be apprehended from it depends on the circumstance, that this affection partakes of the nature of adhesive inflammation, so that in the course of a few days of a neglected or misunderstood attack, the pupil may become completely and irremediably obliterated by an effusion of coagulable lymph. The disease was first particularly pointed out by J. A. Schmidt

of Vienna ; indeed we are indebted to the Germans for the minutest investigation and description of the various internal inflammations of the eye.

The *symptoms* of iritis are attended with all the ordinary signs of ophthalmic inflammation. There is more or less external redness, pain, increased sensibility to light (*photophobia*), and increased lachrymal discharge. The change of color in the iris under inflammation is remarkable. A light blue or grey iris becomes of a yellowish or bluish hue, at other times of a greenish tint ; or it has rather a muddy or confused appearance, dark colored irides assume a reddish tinge. There is a complete absence of the natural brilliancy of the iris. The radiated fibrous texture of health can no longer be distinguished. The contrast is particularly remarkable between the affected and the sound eye with respect to these changes. This alteration of appearance commences at the very edge of the pupil. The internal circle of the iris is first affected, altered in color, and thickened, and this alteration gradually extends to the external and ciliary circumference of the iris. These changes are explicable on the effusion of yellow coagulable lymph into the texture of the parts. Fine hair like vessels are seen running in radii from the sclerotica towards the edge of the cornea forming a zone. There is contraction, irregularity and immobility of the pupil ; it may be partially or completely closed ; whilst adhesion of the iris to the capsule of the lens, is not uncommon.

Partial adhesions of the pupil are a very common consequence of iritis. Sometimes a portion of the circle is closely fixed by the capsule, the rest lying free. More frequently, the preternatural connection is effected by slender threads, so far elongated as to allow of some motion : there may be only one, or many of these fringing the whole opening. There is both pain in the eye, and around the orbit, exacerbations occurring especially at night, and the sight is necessarily obscured or obstructed according to the extent of the preceding changes.

Stages and progress.—The effusion of coagulable lymph exhibits itself under various forms. It may not only be deposited in the texture of the part but it may appear as a yellow abscess or abscesses, slowly arising on the surface of the iris, having a bright yellow color, and pretty regular convex surface, ultimately bursting and pouring out pus, which sinks to the bottom of the anterior chamber, exhibiting the appearance termed *hypopion*. Hypopion sometimes arises also from the lining membrane of the cornea by the bursting of an interlamellar abscess (onyx) or from the capsule of the lens, or the ciliary processes, but this is rare. The lymph may be effused in distinct masses, in small tubercles of a yellowish, brownish or reddish hue ; these are often deposited on the pupillary margin, sometimes on the ciliary edge, or they may occur on any part of the anterior surface. They vary in size from that of a pin's head to a split

pea ; there is often only one ; there may be two, three or more. When they are numerous, and the inflammation very active, the lymph may be secreted so abundantly, as nearly to fill the anterior chamber. Again the effusion may take place from the posterior surface of the iris, from the uvea and posterior pupillary margin, and thus partial and general adhesions are formed between these parts and the capsule of the crystalline lens ; thus, too, a substance is produced filling the pupil, and becoming subsequently organized into an adventitious membrane permanently obstructing the aperture to a greater or less degree. It sometimes happens that blood is effused under violent inflammatory action ; it is sometimes seen alone, but more commonly mixed with the matter of hypopion, or with the tubercular matter of lymph.

As before observed, the motions of the iris are necessarily more or less impaired where it is undergoing this kind of disorder. Its delicate texture so much disturbed, and its interstices filled with a new substance. Its mobility is impeded at the commencement of the inflammation, and when effusion takes place it is completely destroyed. The pupil contracts progressively in its dimensions ; and its figure is rendered irregular from the effusion of lymph and the adhesions which form. These alterations become more conspicuous as the inflammation subsides, because the general contraction is less, and the margin dilates in the intervals of the adhesions. Together with the other changes

the pupil occasionally undergoes alteration of situation, being drawn upwards and inwards, or towards the root of the nose.

Coagulable lymph is deposited on the margin of the aperture, and as it is contracted at the time, a sort of web-like or fibrous structure is stretched across it, completely filling up the opening, and consequently obstructing the rays of light to the interior of the organ. From the very commencement of iritis, alterations are first perceived on the pupillary margin, it becomes thickened and has a spongy appearance, forming a remarkable contrast with the sharp well defined edge of a healthy pupil.

The sclerotica participates in the inflammation and there is consequently greater or less degree of increased sensibility. This is followed, in neglected cases, by the opposite condition of dimness of sight caused by the changes which now take place in the pupil and cornea.

The external redness, (which always exists in a greater or less degree,) is of a limited or partial extent. The sclerotic vessels are seen distended under the conjunctiva, and the vessels of the conjunctiva likewise become dilated, but only in front of the sclerotica. The red zone around the outer edge of the cornea is invariably present.

The constitution sympathizes very strongly with the affection, where it is of an acute character, whilst in the chronic the constitutional symptoms are slightly marked.

The disease may properly be divided into two stages viz. 1st, that of congestion, and 2nd that of effusion.

The anterior chamber becomes diminished from the protrusion of the iris, which is now convex anteriorly, this circumstance must be attributed to the intercepted communication between the anterior and posterior chambers from the thickening of the pupillary edge and adhesion.

Should the inflammation continue without interruption, it may readily be conceived that it will extend itself to the corpus ciliare, choroid membranes and retina with increase of pain and fever, and ultimately with irrecoverable loss of vision, in consequence of the retina having become the seat of the same vascular disturbance observed in the iris. At the same time the mischief is propagated forward, the cornea becomes more opaque, the conjunctiva more inflamed, and great external redness of the eye is added to all the other symptoms, so that it becomes at last a case of universal ophthalmitis.

Sequelæ.—The results of iritis are as follow.

1st. There may be general adhesion of the iris to the cornea after the subsidence of the inflammation, but this is not a frequent consequence. 2ndly.—The color of the iris may be permanently changed. 3rdly.—The pupillary margin may become adherent throughout to the capsule of the crystalline lens. 4thly.—The iris may be elevated into a convex protuberance puckered in various places. It has commonly a dull leaden color

and white tough-looking fibres are intermixed. 5thly. —The cornea may be clear, or more or less opaque; vision in most of these cases is irremediably lost.

With respect to the pupil, the lymph thrown out from its margin may cause the complete closure of the pupil, which is filled up with an ash colored membrane. This state is termed *atresia iridis completa*.^{*} Such cases when uncomplicated are sometimes remediable by an operation for the formation of an artificial pupil.

Such a complete closure of the iris does not always result,—there may be contraction of the pupil, with part of its opening occupied by the adventitious membrane produced by the inflammatory action, and this state of the iris is termed, *atresia iridis imperfecta*, under which circumstance vision is impaired but not destroyed.

In a third set of cases only a part of the iris has been inflamed. When this has subsided a mere thread of opaque matter remains in the otherwise transparent pupil. A single point of the margin of the pupil is thus kept fixed by this thread, whilst every other part is free and moveable. This is termed *atresia iridis partialis*. Such elongated threads are dark colored, that is, they are of the same color as the edge of the pupil or uvea. Like other adventitious or newly formed parts, they partake of the nature of the surface

^{*} Schmidt.

which produces them. Under suitable treatment in an early stage, the adhesions of the pupil are sometimes detached, and then a black mark is left on the capsule, which mark is permanent. In consequence of the blackness of the pupil, these dark colored marks escape notice ; they are, however, occasionally detected by close examination with a strong light on the pupil. These marks are rendered very conspicuous if cataract take place. In some cases the adhesions are white. These changes must necessarily affect the figure and motions of the pupil ; but such alterations are not at all injurious to vision. Sight is nearly as good with the most irregularly shaped pupillary aperture, as with one perfectly circular ; and we often find excellent vision with great and permanent contraction of the opening, provided the retina is in no respect injured.

Causes.—Certain states of the constitution are the chief predisposing causes to iris. It is apt to occur in the *arthritic* diathesis for the peculiarities and treatment of which see rheumatic ophthalmia. Individuals labouring under the influence of the syphilitic poison are the most liable to this form of internal ophthalmia. It may be excited by mechanical injuries, as for instance, the undue movements of the needle in the operation for the formation of an artificial pupil, or from accidental injuries. It may also be excited by over exertion of the organ, or by undue exposure.

Diagnosis.—Rheumatic ophthalmia, catarrho-rheu-

matic ophthalmia, and rheumatic iritis, are three diseases which merge into one another. A degree of iritis almost always attends the two former affections. A well marked case of iritis, however, cannot easily be mistaken. *Retinitis* resembles iritis in the appearance of the external inflammation by which it is attended, and in the closure of the pupil which it speedily produces but its attack is more sudden, its progress much more rapid, the pain of the head by which it is attended, still more insufferable, whilst vision and even the perception of light, are destroyed much earlier, and even before the pupil closes.

Prognosis.—In proportion as the inflammatory action is recent and confined to its original seat in the iris, the prognosis is favourable. The more extensively the morbid changes already alluded to have advanced, the greater is the danger, especially too if the inflammation has been communicated to the cornea. Considerable changes together with effusion of lymph to a great extent, are greatly under the controul of judicious treatment. A change of colour in the whole iris, with considerable contraction of the pupil and an opaque substance in it with intense external redness, great and deep seated pain and complete extinction of light presents a hopeless case. Great contraction and general adhesion of the pupil, a protruded and puckered state of the iris are very unfavorable symptoms. Much will depend on the duration of the inflammation.

Treatment.—The indications of treatment are, 1.—To subdue the inflammation. 2.—To prevent the effusion of coagulable lymph and to promote its absorption if already effused. 3. To preserve the pupil entire, or to dilate it, if already contracted. 4.—To alleviate pain.

In acute cases, the most active *antiphlogistic* treatment must be adopted. Bleeding followed by leeches, purgatives, and antimonials. The patient should be placed on a low diet and all external excitement removed. General bleeding must be repeated till the constitutional irritation has abated, bloodletting should not be omitted even in the mildest cases. Antimony should be repeated in nauseating doses so as to render the system more susceptible of the influence of mercury.

Mercury given so as to effect the constitution is a most valuable remedy. It powerfully promotes the absorption of any lymph which may have been effused, and from its antiphlogistic powers will prevent its effusion, should that not have taken place.

The extract of *belladonna* must be employed from the commencement, smeared on the eye-brow and upper eyelid, and moistened occasionally when getting dry. As it is during the night that the disease appears to make most progress, and as during sleep there is a natural closure of the pupil which must favor the permanent contraction which iritis tends to produce, it is especially proper to apply belladonna at bed time. As

soon as the inflammation has subsided in any considerable degree and the fibres of the iris have become somewhat relieved from the effused lymph the pupil will begin to expand ; and even in neglected cases, where the pupil has been allowed to become almost obliterated the continued use of belladonna for many months is sometimes attended by a gradual dilatation, and a corresponding improvement of vision. A ground of objection to the belladonna, has been urged from an occasional effect viz.—that of its operation on the proper substance of the iris so as to dilate the pupil, but at the same time to leave the pigmentum nigrum, or uvea attached to the capsule of the lens, whence it never afterwards appears to separate. But this is a rare occurrence provided proper means are promptly adopted to subdue the inflammation by the preceding remedies.

Blisters to the back of the neck and behind the ears are useful, after the loss of blood.

The mercurial ointment combined with opium will be of great advantage in alleviating pain, by rubbing it on the eyebrow at night. Mercurial friction will likewise be necessary where from any cause the constitution is unable to bear the internal exhibition of this mineral. The perseverance in the use of mercury will generally be required until the natural color of the iris is restored, the red zone round the cornea gone, and vision restored. This will in most instances require from four to six or eight weeks. It is not denied that iritis may be overcome without the use of mercury,

but never with such safety to the organ. The general disorganization of the iris, contracted, closed, or partially adherent pupil, obstruction of that aperture by adventitious organizations, and opacity of the crystalline capsule, are all powerfully checked by the mercury.

The only difference between iritis of a *syphilitic* origin and idiopathic iritis is, that the vascular zone around the cornea is of a slight brownish tint, and the contraction and displacement of the pupil are more general towards the root of the nose ; the reddish brown lymph effused in small masses, appearing like drops upon the iris, the nocturnal character of the pains being very marked ; the symptoms are of a chronic character ; and a modified adaptation of the same method of treatment is requisite.

Arthritic iritis is recognized by the peculiar state of the constitution. The zone is not of so bright a red color. There is a narrow white boundary interposed between the zone and the cornea. The pain is not severe ; and there are no masses of lymph effused, though adhesion to the capsule takes place. This form of iritis is apt to recur in arthritic subjects, and that frequently. The tendency to disorganization is not so great as in other forms of iritis. Cupping, leeching, counter-irritation by blisters, active purgatives, and alteratives, as the Plummer's pill, are generally adequate to check the complaint. The mercurial and opiate friction is very useful as well as tepid fomentation.

Iritis is in many cases preceded by *cutaneous* eruptions, and seems to be the consequence of such eruptions.

tions being repelled, or interfered with in their progress. There is a great connection in point of morbid phenomena between the iris and the skin. Lepra is not uncommonly thus followed by iritis.

II. Inflammation of the choroid (choroiditis) ineipient disease of this coat of the eye is necessarily from its concealed situation attended with considerable obscurity ; besides which it is often complicated with iritis. Nevertheless it is important to distinguish choroiditis as an occasionally distinct affection of a very dangerous nature, and attended with peculiar symptoms.

There is discoloration of the white of the eye.—From the pressure outwards of the inflamed and tumefied, choroid ; the exterior tunics of the eye become extenuated, so that the choroid shows its dark colour through the sclerotica, which therefore appears blue or purplish. This discolouration of the eye varying in degree according to the severity and duration of the disease ; is followed by a degree of protrusion on one side or other of the eye-ball, generally near the cornea, and more frequently above or to the temporal, side of the cornea than below or on the nasal side. The part becomes staphylomatous, and is generally, of a deep blue colour with varicose vessels running over it. Several such tumors may surround the cornea. There is not unfrequently an effusion of watery fluid between the choroid and retina. The vessels of the sclerotica are more or less enlarged. There is often considerable displacement of the pupil, generally upwards and outwards.

This displacement may be owing to some affection of one or more of the ciliary or iridal nerves which running forward between the sclerotica and choroid, pass through the annulus gangliiformis, and ultimately reach the iris. The cornea sometimes becomes implicated in the disease, either at its edge, or in irregular spots of whiteness over its whole superficies. The eye may ultimately become so enlarged as even to protrude to a considerable degree. There is generally intolerance of light and epiphora; pain at the top of the head, the upper part of the temple and cheek. Vision is variously impaired. There may be dimness of sight confined to one or the other side of a perpendicular line or above or below a horizontal line (Hemiopia) or there may be double vision.

Constitutional symptoms.—Various degrees of febrile excitement attend this disease, and general cachexia is liable to ensue in advanced stages. The digestive organs are frequently deranged even from the commencement. There is want of appetite, acidity of stomach, costiveness, flatulency, and foul tongue, attending the disease in many instances.

A predisposition to this disease seems to exist in some unhealthy habits and it is often excited in them from over use of the organ at minute objects, exposure to intense heat and light &c. It would seem to be not uncommon in India amongst such classes of people of unhealthy constitution, who are much exposed to the above exciting causes.

Much will depend on the duration of the disease with respect to PROGNOSIS.

Blood-letting, purgatives, and iodine, followed by tonics and counter irritation make up the chief means of treatment.

Puncturing the sclerotica, with a view to evacuate the aqueous fluid is at least but a palliative, but it should only be attempted in the chronic stage—for this purpose a cataract knife should be plunged a short distance into the protrusion and directed towards *the virleous* humour.

II. INFLAMMATION OF THE RETINA—(*Retinitis*) occasionally occurs, especially after long continued straining of the sight in the examination of minute objects under a strong light reflected into the eye, either immediately from the object of examination or from a speculum. There may be, and perhaps generally is a predisposition to disease in the eye itself from plethora.

The instances are numerous of the injurious effects on the retina from sudden and vivid flashes of lightening, or imprudently viewing an eclipse of the sun. Prisoners who have been long confined in the darkness of a dungeon, have been seized with retinitis on being brought suddenly forth into the full glare of day. Saint-Ives notices the case of a man who became blind in consequence of going too close to the light and heat of a strong fire, in attempting to tie a string to a fowl turning on the spit; and another of a workman in the

mint, who lost his sight from the brilliant flashing to which he was exposed whilst pouring metal into a red-hot crucible. In both instances retinitis most probably was induced.

The Esquimaux who inhabit Hudson's Bay are well aware of the loss of vision which arises from exposing the eye to the constant view of a country covered with snow. They employ a kind of preserver which they term snow eyes. These consist of two pieces of wood or ivory, so formed as to fit the eyes, which they completely cover and are fastened behind the head. Each piece presents a narrow slit, through which every thing is distinctly seen. This invention preserves them from snow-blindness which is apt to be occasioned by the strong reflection of the sun's rays; and which, it is probable is the effect of inflammation excited in the retina.*

These instruments also increase the powers of vision so that the Esquimaux are so accustomed to their use, that when they are desirous of viewing any thing at a distance, they mechanically apply them to their eyes. Different accounts are given of the slit or slits in these instruments, for some tell us there is only one in each eye-piece, and that it is an inch long and narrow, while others say that there are two about a quarter of an inch long. They are probably regulated by the *fancy* of the wearer.†

* Mackenzie's practical treatise p. 389.

† Loco citato.

Blinding persons by producing retinitis was, and still is, in some countries, a mode of punishment. The person is compelled to look steadily on a concave mirror of polished steel, held opposite to the sun. This would excite speedy inflammation of the retina, and certainly end in a greater or less degree of insensibility to light. Some such method must be employed in India at this day, as many of the native princes, who have been condemned to loss of sight by the jealousy of their rivals, but are suffered to live in a state of captivity, are said to have no appearance, at a little distance, of being blind.*

Chronic cases of retinitis not unfrequently present themselves to our observation, under the designation of weakness of sight, and are characterized by a morbid sensibility to light and slight obscurity of vision, followed after a lapse of time by gradual contraction of the pupil, immobility of the iris, and amaurosis. Watchmakers, jewellers, and those who spend great part of the day and night reading and writing, are apt to be affected in this way. Such cases are often injured by stimulant and tonic treatment, while on the other hand they are greatly benefited by leeches round the eye.

The following are the symptoms of sudden and severe retinitis. The patient first complains of a general feeling of pressure and tension in the whole eyeball. To these there succeeds an obtuse, deep-seated, pulsat-

* Archives generales de Medecine. Tome 22 p. 477 Paris, 1820.

ing pain, which seems to increase every moment, and soon extends to the eyebrow and cranium. The power of vision is already sensibly diminished, and every hour becomes more and more feeble. At the same time, the pupil is observed to have lost its glancing blackness, and to be much contracted. Without becoming angular or deviating from its natural situation, it at length completely closes, the iris having reached its greatest possible degree of expansion, and seeming no longer to be perforated by any central opening. Long before the pupil is closed, and there is no longer any trace of perception of light from without, the patient experiences a troublesome sensation of fiery spectra with every pulsation of the internal blood-vessels of the eye.

While these changes are taking place, the iris loses its natural color, becoming greenish or reddish according to its original hue. The anterior chamber is strikingly diminished in size, the iris having advanced towards the cornea. By the time that this advancing of the iris is first discerned, which is generally when the pupil is still of considerable size, the whole sclerotica is rose red. The conjunctiva some time after presents a pretty thick net-work of blood vessels, and the cornea loses much of its natural lustre without becoming absolutely opaque. The last mentioned symptoms are attended with severe inflammatory sympathetic fever and insufferable and almost maddening headache. Sometimes it happens that during the first period of the disease, the pupil, though much contracted, does not

completely close ; but it is cloudy, and on looking at it through a magnifying glass, or even by merely concentrating the light upon it, is seen to be reddish-grey while the power of vision is totally lost.

So severe are the sympathetic fever and headache which attend retinitis that it simulates phrenitis or brain fever.

The pain of the eye now becomes unequal ; it is still pulsative, but is now attended by a feeling of cold and weight in the part. Shiverings take place, and there suddenly appears a quantity of pus at the bottom of the anterior chamber. This matter presents a horizontal surface, and is sometimes seen to change its position on the head being moved from side to side. —It constantly increases in quantity, till it not only reaches the pupil, but at length fairly fills the anterior chamber. It may accumulate to such a degree, especially in neglected cases, that the cornea projects with insufferable pain, assumes the appearance of an abscess, and at last gives way.

If the pupil has not completely closed by the end of the first stage, we see, just at the moment when the hypopion begins to form, fine whitish filaments of lymph shooting from the edge of the pupil towards the centre. Viewed through a good lens, these have the appearance of a delicate cobweb. After the pus has covered the pupil, and remained perhaps long unabsorbed, this cobweblike pseudo-membrane becomes whitish-yellow from little particles of the pus lodging in its interstices,

and sometimes a single piece of what appears to be thickened purulent matter attached to and intimately connected with the pupillary margin of the iris projects through the pupil. But if the pupil has closed completely in the first stage, nothing of this spurious cataract is observable.

The *prognosis* in retinitis is not unfavorable if a proper method of treatment be commenced before the pupil is much contracted or the power of vision greatly lessened. If vision seems already extinguished the prognosis is extremely unfavorable. Beer, indeed, had in two cases seen vision return with the arrest of the inflammatory symptoms, but in both a very considerable weakness of sight remained during life; and the patients could read large print only with much difficulty, and small print not at all. If the pupil be once closed even before the retina appears to have become insensible, there is no longer any hope of preserving sight, for even should the pupil re-open in some degree, as it occasionally does on the inflammatory symptoms being arrested, yet it remains small and motionless, and the eye is still blind. If retinitis be misunderstood in its commencement, neglected or mistreated, it proceeds rapidly on to a dangerous inflammation of the whole eyeball.*

In the second stage the *prognosis* is always bad. For before the disease has advanced so far, vision is

* Traver's Synopsis.

irretrievably lost. All that can be done is to endeavour to save the form of the eye, by limiting the supuration as much as possible. If this disease has been allowed to go on to general ophthalmitis, attended with chemosis, there is much danger that in the second stage not even the form of the eye will be saved.

Treatment.—Complete rest of the eyes and of the whole body, darkness, abstinence, and active depletion, followed by the rapid introduction of mercury into the system, are the means to be depended upon in the first stage of retinitis. Copious blood-letting from the arm is to be immediately followed by a plentiful application of leeches to the temple and forehead. Should the pain of the eye and head still continue the temporal artery ought to be opened, and a considerable quantity of blood abstracted.

Calomel with opium ought to be given in frequent doses, till the mouth is affected.

Belladonna is to be applied in the usual way.

In the second stage preservation of sight is out of the question. A warm emollient poultice is to be laid over the eyelids. If only a small quantity of matter be present in the anterior chamber, we must on no account let ourselves be induced by that to open the cornea, for the purpose of evacuating it; but trust to the absorbent effect of the mercury, assisted by blisters behind the ears or the back of the neck. Beer recommends the eye in that state to be touched repeatedly in the course of the day with vinum opii, by the eare-

ful use of which in combination with the internal employment of opium and sometimes of cinchona, he had seen collections of pus in the anterior chamber completely disappear. Should the hypopion increase, so that the anterior chamber is filled, we cannot trust to its absorption, but must give exit to the matter by opening the cornea with the extraction knife. In such circumstances, the natural appearance of the cornea and iris is completely lost, the eyeball sometimes remaining flattened in the situation of the cornea, while in other cases it becomes *staphylomatous*.”*

b. Amaurosis.—Although it forms no part of the plan of the present work to treat of amaurosis, a disease too often the result of irremediable structural disorder either in the brain, the thalami, or in some part of course of the optic nerve, I cannot refrain from alluding to the many instances of *functional* amaurosis in this country originating from inanition or debility, however, induced, and from the undue excitement of intense light. Many of these cases are susceptible of cure by nutritious diet, a course of tonics, blisters in the vicinity and around the orbit and the cold bath. The *nyctalopia* or night blindness so exceedingly common in India originates in an exhausted susceptibility of the retina from the intensity of light, colors, and temperature, and differs only in *degree* from the continued functional amaurosis. It will generally be found to yield to a similar system

* Mackenzie's Practical Treatise, p. 308 et. seq.

of treatment. These affections may be grouped under the class of *asthenic amauroses*. In some protracted cases strichnine is beneficial exhibited internally, and applied to the abraded surface caused by a blister.

In the congestive, sympathetic, and metastatic forms of functional amaurosis, however produced, we are too seldom consulted in this country at a sufficient early period, when by directing our attention to the original affection or by attacking the proximate cause by cupping, alteratives, purgatives and counter-irritants, by a judicious system of regimen, and by the removal of all irritating excitement of the organ, and lastly, by the exhibition of tonics, we might have hoped to have cured the morbid action which has ultimately led to structural disease of the retina.

IV.—GENERAL INFLAMMATION OF THE EYE.

General inflammation involving both the external and internal textures of the eye, is by no means of unusual occurrence, as the result of the rude and unskilful operations of the native surgeon, for cataract, on which account I deem it desirable to treat of it somewhat at length. It occurs most usually in individuals of robust constitution, and requires for its production some very serious exciting cause. It follows iritis, retinitis, and choroditis. It is characterized by the following symptoms, viz. intense pain, external

redness, more or less swelling externally, with increased lachrymal discharge and redness, with tumefaction of the upper lid. The severe pain is a very prominent feature in the affection; sometimes it is described as acute, and sometimes of a dull aching character, at other times conveying a sense of throbbing and burning. There is considerable tension, the patient expressing himself as though the eye would burst from its socket. The pain is not confined to the anterior part of the eye but is deep seated, and extends to the surrounding parts—the brow, the cheek, the temple and the back of the head. The redness, though inconsiderable in the first instance, gradually increases, and ultimately the surface of the eye assumes a bright red color like that of scarlet cloth. The vessels of the sclerotica first become the seat of congestion, and the redness observable in an early stage of the disease is seated in the sclerotic coat. The conjunctiva soon participates in the vascular congestion, and the distention of its vessels produces the bright scarlet appearance which conceals the fainter pink of the sclerotica. The conjunctiva then begins to swell, and a deposition of lymph takes place not only into the texture of the membrane, but into the loose cellular tissue which unites it to the sclerotica (chemosis.) Hence the conjunctiva is elevated on the surface of the sclerotica, above the level of the cornea, the edge of which it often overlaps so as to conceal a considerable portion of it from view.

There is great intolerance of light, spasmodic closure of the lids, and contraction of the pupil. The motions of the eye and lid are suspended, the whole external surface becomes exquisitely sensible, and the patient keeps the organ instinctively in a quiescent state. The surface of the organ at the commencement of the affection is both stiff and dry, but this is soon succeeded by a copious flow of tears which is increased by the least exposure. The eyelids, particularly the superior, are red, especially at their ciliary margins, and more or less tumefied.

The second stage of general inflammation of the globe is accompanied by the manifestation of various changes of structure. The iris is altered in color, loses its brilliancy, and no longer exhibits the usual motions on varying the quantity of light to which it is exposed. The pupil contracts and loses its clear black appearance. The cornea loses its transparency, becomes more or less opaque; and vision is lost. The alteration in the cornea, and the condition of the pupil, would account for imperfection or loss of sight but the latter often occurs while the cornea is sufficient clear for the transmission of light, and the pupil still open, in consequence of the violent inflammatory disturbance and consequent change of structure in the retina. The patient still sees, or fancies he sees luminous sparks and flashes of fire before his eyes, when there is no light in the chamber, or during the night, in consequence of the disturbed state of the internal circulation.

With the continuance of the inflammation the globe swells, and the sense of its being too large for its bony cavity in which it is contained is not very erroneous. When we find that the globe is actually increased in size, that the iris is changed in structure and that the retina has lost its sensibility, there is little reason to doubt that the internal parts of the eye generally are inflamed. From the internal and external swelling the globe of the eye is actually fixed in the anterior aperture of the orbit, and rendered motionless. The tumid palpebræ are protruded; *ectropion* of the lower lid takes place, and a portion of the anterior surface of the eye projects externally in a denuded state like a piece of red flesh. The mucous membrane of the lid becomes the seat of inflammation equally violent with that of the conjunctiva of the globe; effusion takes place into the cellular texture, of the lid generally; the external integument becomes red, as well as its conjunctival lining, and the consequent swelling forms a large convex protuberance on the upper lid.

In a local disease of such violence affecting so vascular and sensible an organ immediately in the vicinity of the sensorium a marked constitutional sympathy may be expected, and accordingly we find inflammatory fever of a very decided character from the commencement of the affection. There is a quick, hard, full pulse; flushed face, and pain of the head, a dry hot skin, with white and rather dry state of the tongue, deficiency of appetite, restlessness, and generally want of sleep.

If the disorder be not checked, the local pain and febrile state of the constitution proceed to a great height. Under such an aggravation of the local and general symptoms the pain changes in character; it becomes throbbing; rigors are felt, and suppuration of the globe has taken place; the cornea turns of a dull white colour and then yellow, and the globe is ultimately converted into an abscess. The occurrence of suppuration does not produce the relief usually experienced from that change, in consequence of the firm unyielding nature of the sclerotica and cornea; the pain, together with the sense of bursting and throbbing continues for some days, until the cornea bursts and gives exit to the matter contained in the interior of the eye.

After the matter is discharged the patient experiences relief for a time; the tunics of the eye collapse into a small space, shrink into the orbit, and the original form of the organ is completely lost. The vitreous and crystalline humour of the eye generally escape when the bursting of the globe takes place. Such is the termination of this affection in its worst form. When it does not proceed so far; and where its progress has been checked by treatment, the cornea becomes opaque, and remains so, the pupil is either closed, or very much contracted, and the aperture filled by a newly formed adventitious substance the consequence of effusion into that opening during the inflammatory stage and the subsequent organization of effused matter. In this case vision is generally either

completely or in a great degree lost but the form of the eye remains. The most favourable termination that can be expected is the recovery of the organ, with the cornea clear and the pupil open ; still in this case the retina has generally suffered so much as to produce greater or less imperfection of vision.

This inflammation is characterized by its commencing at one and the same time in the external and internal tunics of the eye. Internal inflammation may spread to the external coats, or external inflammation may extend inwards : but in this affection, both sets of parts are inflamed at the same time. It is characterized by the uniformity and correspondence in degree, between the various symptoms, viz. the redness, the pain, the increased lachrymal discharge, and the tumefaction ; by the regularity of its course, beginning in a moderate degree, gradually increasing and proceeding without any interruption or remission to its full development, and by the severity of the constitutional disturbance which accompanies it.

Prognosis.—If the affection be seen early and actively treated we may expect to arrest it, and to prevent change of structure in the organ and consequent injury or loss of sight. But if we find the inflammation fully developed, even in a comparatively early stage, we shall hardly succeed in controlling it, so as to preserve the powers of the organ unimpaired*. There is no peculiar mode of treatment differing from that which is appli-

* Lawrence's lectures in the Lancet.

cable to the severe forms of internal inflammation, to which the reader is referred: see the treatment of retinitis. Where suppuration of the ball has taken place great relief will be afforded by a deep transverse incision, dividing the iris, cornea, ciliary ligament, and some extent of the sclerotica. The eye should then be covered by a soft poultice contained in a cambric bag.

SEC. II.—ON MORBID AFFECTIONS OF THE PALPEBRÆ AND CONJUNCTIVA.

I. Ectropion or eversion of one or both lids, may originate either from inflammation and strangulation under acute inflammation, from relaxation of the conjunctiva, from excoriation of the integuments of the lower lid, or from cicatrices. These are the most general causes. The lower lid is the most frequently affected. In some instances the swollen and granulated conjunctiva is exposed, and like all mucous surfaces when exposed, assumes the character of integument. The conjunctival covering of the eye-ball and cornea becomes likewise dry and wrinkled, in the worst cases completely destroying the transparency of the centre of vision. Inflammation of the whole surface of the eye-ball, with ulceration and a varicose state of the vessels of the cornea is a frequent consequence.

Treatment.—Where the alteration originates from inflammation and strangulation, as in the ophthalmia of

infants, or in severe cases of purulent ophthalmia, recourse in the first instance is had to scarification of the everted conjunctiva, as soon as the tumefaction has subsided. By thus unloading its vessels, the lid may generally be restored to its natural position by gentle manual assistance pressing at the same time the serous effusion from its substance, and suddenly bending the edge and inverting it. The lid can then be retained in its original position by means of a compress and bandage, provided the inflammation be not severe. It may be necessary to repeat our efforts for the reduction, or to direct the attendants to do so : slight stimulants should be daily applied to the eye, consisting of a solution of the sulphate of alum, the nitrate of silver, or the sulphates of zinc and copper. Should the above measures fail the condition may be readily ameliorated by destroying a portion of the relaxed conjunctiva by means of liquid strong nitric acid, pencilled along it so as to produce a slough, an eschar and contraction ; or by the excision of a small fold of the relaxed conjunctiva with a pair of sharp curved seissars, by which means the required contraction is effected, care should be taken not to remove too large a portion of the membrane, otherwise permanent inversion might be produced, strips of adhesive plaster, compress and bandage are then to be applied, and the progress of the cure carefully watched by occasionally removing the dressing.

2. *Eversion* from *relaxation* of the lid is by no means uncommon in old persons, in consequence of inflam-

mation of the conjunctiva and meibomean follicles. The orbicularis palpebrarum no longer possesses the power of supporting the lids, and the tensor tarsi is likewise weakened, thus allowing the punctum lachrymale to fall forwards, and permitting the tears to escape over the lids, being no longer guided in their proper course towards the inner canthus. Considerable atony attends this affection, the conjunctiva is of a pale red, loose, and flabby texture, and loses much of its sensibility to the contact of external impressions.

In the less inveterate forms of the complaint the employment of escharotics, after having soothed any degree of inflammatory action that may exist, will frequently be effectual in counteracting the misplacement; for which purpose the sulphate of copper or nitrate of silver either solid or in solution may be employed. Scarifications of the inflamed conjunctiva are likewise useful, as well as supporting the lid by means of a carefully adjusted compress and roller. But the most effectual treatment, especially in inveterate cases, will be found to consist in the removal of a portion of lid by a V shaped incision. The dimensions of this incision must be carefully proportioned to the degree of relaxation, otherwise we might endanger the removal of too much, and thereby induce an inversion, or we may not, on the other hand, remove sufficient entirely to eradicate the defect. The edges of the incision are afterwards united by a small stitch of the interrupted suture and the dressings may be applied as in the first variety of the complaint.

3. The same principles are applicable to the *treatment* of eversion produced by excoriation of the lower lid and check, induced by long continued ophthalmia tarsi. In such cases the edges of the lids are rounded off, the meibomean apertures partially or totally obliterated, and the eyelashes completely destroyed.

4. In eversion of either lid from a cicatrix whether originating from wounds, ulcers, or burns, the eyelids are so loose, that during cicatrization very little new skin is formed, hence the greater degree of contraction, and the consequent eversion.

The attempts that have been made for the cure of this variety of ectropion from the period of Celsus, by an incision of the integuments and detachment of the adhesions down to the bone and the tarsal cartilage, have tended more to increase than remedy the evil. The parts yield indeed immediately after the operation and the lid readily assumes its natural situation, but the moment cicatrization has again taken place, the contraction becomes greater than before. The only successful treatment is the following. A longitudinal portion of the conjunctiva should be removed. This in slight cases will be found effectual, but in the more severe cases the V shaped incision must in addition to this be practised, as well as the division of the cicatrix and detachment of its adhesions to the subjacent parts.

Besides this it will be necessary to detach a portion of contiguous integument, which is to be bent inwards and attached to the gaping surface of cellular

membrane, exposed by the removal of the cicatrix. This improvement on Guthrie's method introduced by Mr. Morgan, is the certain way of preventing a return of the deformity, from the re-contraction of the cicatrix by the former method. The transposed portion of integument is to be confined in its new situation by curved needles and the twisted suture, or by platinum sutures, and a light bread and water poultice used as a dressing.

5. Some very severe forms of the disease sometimes occur from extensive burns, wherein both eyelids are everted, and dragged towards the temple or even almost obliterated. It has been recommended in such instances not only to divide the cicatrix, to remove a portion of the exposed conjunctiva, and perhaps excise a portion of the whole thickness of one or both lids, but it has been found useful to pare away a small portion of the edge of each lid at their outer angle, and then to bring the two together by a stitch.* This tends to reduce the opening between the lids to its natural length, and removes much of the deformity, but a more successful method would be to accomplish two extensive and deep elliptical incisions passing from the root of the nose to the temple; the superior incision extending along the forehead, and the inferior along the cheek, and considerably wide of the original position of the lids. These are then to be carefully dissected

* Mackenzie, p. 152.

from the subjacent parts and detached, together with the tarsus, and all contracting bands carefully divided. The loosened and detached portions should be more than sufficient to admit of their meeting to form the artificial lids. They should even considerably overlap each other at the point of contact, to allow for the subsequent contraction. The lids being moulded and adjusted are retained *in situ* by a light compress and bandage. The chasms which are occasioned by such deep dissection are to be dressed from the bottom, and allowed to fill up by granulations, all adhesions being carefully destroyed by escharotics. A longitudinal fold of the conjunctiva lining both of the superior and inferior palpebræ should be also excised, and this may require to be repeated from time to time during the cure.

There are other causes of eversion, but they seldom occur. It may arise for instance from disunion of the temporal angle at the lids, or from caries of the orbit. In the first variety treatment similar in principle to that for hare lip has been recommended, viz. the removal of the edges of the ulcerated and disunited commissure of the lids, which are then united by first intention. This of course is not to be attempted until all ulceration and inflammation of the lids have completely subsided, which would otherwise prevent the success of the operation.

The same principles of treatment will be applicable to the last variety, or that originating from caries, as

is adopted for the severer form of the second and third variety of eversion, and which it is unnecessary to repeat. But, of course, nothing of this kind can be attempted until the diseased condition of the bone has entirely healed.

II. ENTROPION or Inversion of the lids, both in its acute and chronic form, is so exceedingly common in the East, as to render the treatment of it one of the most interesting and useful subjects of the surgeon's attention. The disease generally originates from neglected cases of conjunctival inflammation. It may also be induced by the contraction of a cicatrix in the conjunctiva.

1. In the acute form of the disease the lower lid is its most frequent seat. The integument of the inverted lid is generally tumefied, and the edge directed inwards, the eyelashes being in contact with the eyeball occasioning much irritation, and causing the patient completely to close the palpebræ. The affection leads slowly but certainly to complete opacity of the cornea. The orbicularis palpebrarum is in a state of spasmodic action, the least exposure increasing this spasm and augmenting the severity of the symptoms. On applying the fingers to the lid and slightly drawing it down, the ciliæ start into view, and by slightly increasing our efforts they may be induced to assume their natural situation. On withdrawing the fingers they may remain so for a few moments, and then become inverted again with a sudden jerk.

2. The *chronic* variety of entropion is the result of

long continued inflammation of the tarsus, or of protracted chronic inflammation of the conjunctiva. The margins of the affected palpebræ are thickened, irregular, and notched from repeated ulcerations and cicatrices, and the length of the palpebræ is considerably diminished. Both lids are equally liable to be affected with this distortion, and frequently both eyes. The cartilages of the tarsus become preternaturally bent, and the inversion is so obstinate, that no traction with the fingers is sufficient to evert them.

The cilia are generally few in number, the conjunctiva both ocular and palpebral inflamed and granular, the cornea vascular and nebulous, and the irritation extreme. In many old subjects, however, a degree of insensibility and callosity at length takes place, rendering the affection less insupportable.

The *treatment* of the acute variety is best fulfilled by removing a transverse fold of the skin, which should be regulated as to length according to the extent of the inversion. A pair of broad convex-edged forceps may be used for the purpose of securing the skin, which is then to be excised by means of a pair of sharp curved scissors. The edges of the wound are to be united by two small stitches. This will generally be found effectual in re-establishing the natural position of the lid. Another method may be employed by means of sulphuric acid. This escharotic may be applied by dipping a piece of wood in the acid, and rubbing it along about a line's breadth from the edge of

the palpebræ. The contraction, which follows the cicatrization beneath the escharotic generally restores the lid in the same manner as excision. It is necessary to use the precaution of drying the portion of skin that has been touched in order to prevent any portion of the acid falling in upon the eyeball.

Such treatment is altogether ineffectual in the *chronic* form of the complaint. The only effectual method of cure consists in the following. The lid is to be fixed between the thumb and forefinger of the left hand, or the right if more convenient to the surgeon, and pulled slightly forward. A sharp pointed bistourie is then to be introduced under the lid, and pushed forward through it, dividing it perpendicularly, close to the external canthus, to the extent of three lines. A precisely similar incision is then to be practised towards the inner canthus, close to the punctum lachrymale, but taking particular care to avoid wounding it. On completing these incisions the lid will immediately be perceived to have resumed its proper position, or if it be the upper lid, rather to hang forwards over the inferior lid. The removal of a longitudinal fold of skin, near to the edge of the lid, the edges of which are to be brought together by two small stitches, now completes the operation. In the more inveterate cases Mr. Guthrie's method, in addition to the above practice, may be adopted, which consists in inserting two or three small silk ligatures into the edge of the palpebra, which is then to be everted over the forehead, and retained in

that position by means of adhesive straps placed over the ligatures along the forehead. Whether this additional precaution be employed or not, it is necessary to allow the perpendicular incision slowly to fill up by granulations. Thus the disease is effectually removed, and where the parts have entirely healed the deformity is inconsiderable. Where the lids have been everted and turned back over the forehead by ligatures, it will be necessary to invert the lid on the second or third day, and to discontinue their use altogether, so soon as it is ascertained on inspection and adjustment of the lid, that the object is attained, and that the part has become sufficiently everted to assume its natural place, when the healing process shall have been completed. The divided fibres of the orbicularis necessarily shrink, and do not reunite at the point where the perpendicular incisions have been made, and the divided cartilage will be found to have lost much of its irregularity of figure.

The same mode of operation is requisite for inverted cilia or for an irregular or double row of cilia, respectively termed *trichiasis* and *distichiasis*, as is employed for the less severe forms of entropion, either by removal of a fold of skin, or by the application of sulphuric acid, regulating the extent according as the inversion is either general or partial. Where the trichiasis, or distichiasis is only partial, the evil may be eradicated by carefully extirpating the hairs by means of a pair of broad pointed forceps, the hairs are to be

drawn out in the direction of their length, so as to avoid their breaking off. A fold of integument may also be removed.

The native oculists of India have a method of operating for these various forms of inversion by removing a longitudinal fold of skin, and extirpating by means of the fingers and a hook the cellular membrane above the edge of the tarsal cartilage, uniting the edges of the wound by stitches of the interrupted suture. I have seen them perform this operation on the upper lid, but its result is by no means satisfactory. Mr. Morgan is in the habit of excising the whole cartilage in the most aggravated forms of the disease.

III. PTERYGIUM.—The term *Pterygium* is applied to a disease consisting of a thickened and elevated portion of the conjunctiva of the eye-ball. It is usually of a triangular form with its acutest angle directed toward the cornea. It is extremely rare for the disease to exist in any other part of the eye than that of the inner angle. It essentially consists in a varicose state of the vessels of the conjunctiva. In some instances it is semitransparent, and thinly strewed with blood vessels, in others the vessels are so numerous as to assume a fleshy appearance. The chief importance of pterygium is its tendency to advance along the cornea to the centre of the pupil, and thus impede vision.

Causes.—The affection has no necessary connection with the *caruncula lacrymalis* or *membrana semi-*

lunaris. Beer mentions two instances of pterygium occurring on both sides of the same eye.*

The conjunctival membrane is naturally more loose and vascular at the inner angle, than at any other parts, and probably the increased vascularity of this portion may be excited by much exposure to the light and by the irritation of particles of sand; for the disease is extremely common in the arid and sandy provinces of India.

Pterygium is entirely of a local nature, and is capable of removal either by surgical operation or by the slower process of sacrifices and stimulating applications.

Treatment.—For the membranous form of the disease (pterygium tenue,) not yet having advanced on the cornea, the Indian operation is generally effectual, and is very simple. A small sharp hook is introduced under the upper lid, the patient is directed to open his eyes and the lower lid is depressed; the point is then dexterously insinuated behind the pterygium (vide plate XI, fig. 1) drawn forward, and snipped off with a knife or sharp pair of scissors. No dissection is requisite—the remaining edges shrink and disappear. A slightly stimulant lotion may be employed for a few days, and the part may be touched daily with the vinous tincture of opium, or red precipitate ointment.

The same mode of operation is adapted for the re-

* Ophthalmologische Bibliothek von Himly and Schmidt.

removal of the more fleshy form of the disease, with this addition, that it may be requisite to dissect off any remaining portions with a pair of forceps and sharp scissors, especially from about the cornea. It will be necessary on such occasion to have both the lids secured by the fingers of an assistant. Care should be taken to avoid the semilunar fold. The operation is generally followed by slight inflammation and suppuration, which is succeeded by the formation of a new portion of conjunctiva.

There are sometimes, though rarely, two or more pterygia on the same eye, the apices of which coalesce on the cornea and thereby materially impair vision. When several of these unite throughout their whole extent, the disease has been termed *pannus*, in which they cover the half or more of the eye.

When the disease is small it occasionally undergoes spontaneous absorption, and therefore need not be submitted to any treatment.

A small yellowish elevation situated partly in the conjunctiva, and partly in the cellular tissue, connecting the conjunctiva to the sclerotic, sometimes occurs. It is most frequently situated on the temporal side of the eye. It is readily removed by the aid of forceps and scissors.

Wardrop adds to the list a fourth description, named the fleshy pterygium, which he considers to originate in common triangular pterygium improperly treated by repeated scarifications, causing the disease to grow

more rapidly. It at length projects between the eyelids, involving the semilunar membrane and caruncula lachrymalis. It is to be removed by the knife,

IV. ENCANTHIS.—The caruncula lachrymalis is the seat of this disease, which seems to consist in a morbid enlargement involving this small vascular body, and ultimately the membrana semilunaris. It is divided into the simple and malignant forms. The growth is of a reddish color, and studded with numerous granulations. It often extends to a considerable size, involving the puncta lachrymalia, compressing or displacing them in consequence of which it is accompanied by a flow of tears. The whole of the inner corner of the eye may be thus involved in the disease from the caruncula to the cornea, and the granulations protrude in a lunated form, occasioning considerable deformity, preventing the closing of the lids, and impeding the functions of the eye itself.

In schirrous encanthis, a rarer form of the affection the caruncula is of a firm, hard, and rather livid appearance, with varicose vessels ramifying over its surface, and attended with lancinating pain. Hæmorrhage is easily excited, and the hairs which grow from it are much stronger than natural. At length ulceration takes place, the edges become everted, and the cancerous and excoriating character of the discharge becomes fully established. If the disease be permitted to proceed, the lids, the lachrymal passages, and globe of the eye become involved in the ravages of the disease.

Extirpation of the disease can be best effected by seizing the part with a small hook, or a curved needle armed with thread, and pulling it forward, where it is completely separated from its base by a pair of sharp seissars. The lids and ball of the eye are secured during the operation by means of the fingers. Should there be any appearance of malignancy, it will be necessary to extend the incisions. Stillicidium lachrymarum is liable to follow the loss of the caruncula and semilunar fold.

Cancerous ulceration is not merely confined in its origin to the caruncle and semilunar membrane, but may originate in a wart on the lid, or the conjunctival lining of the palpebræ.

SUB-SEC. II.—DISEASES OF THE EXCRETING LACHRYMAL APPARATUS.

Introductory remarks.—The important practical points which present themselves for consideration are, the two distinct stages or forms of this affection. So long as there exists no opening to establish a communication externally to the lachrymal sac, the disease is essentially inflammatory, whether of an *acute* or *chronic* character. So much has been ably written on the symptoms and causes of these two forms of the complaint, that it seems only necessary for me to offer a few practical remarks on the treatment of them, and

then to consider the advanced form of the disease when perforation of the sac has taken place, and the malady in the strict acceptation of the term becomes a true fistula lachrymalis.

Treatment. I.—In the *acute* variety the local application of leeches will be found particularly advantageous, followed by revulsives, fomentations and fumigations. The constitutional treatment will consist in the free administration of purgatives and antimonials, with a view to arrest the inflammatory action and prevent its passing into the suppurative stage. On the supervention of the suppurative stage; should our efforts have been ineffectual in preventing it, all debilitating treatment should be immediately discontinued, but the fomentations should be continued, during the day and poultices at night.

It will most probably follow that the secretion of puriform mucous will continue increasing, and that the process of progressive absorption will advance so as to render the ulceration of the parietes of the sac inevitable. We must therefore now open the sac by means of a sharp bistoury or a lancet, carrying our incision in the direction of the long diameter of the swelling, enlarging the opening as we withdraw the instrument. A silver probe is now introduced into the sac, and directed toward the nasal duct. We shall generally find that it descends with facility into the nostril. The parts are then to be washed by means of a lachrymal syringe, which is to be repeated daily. A poul-

tice is then to be applied, enclosed in a thin linen bag. After the opening has continued for several days and the matter has been freely evacuated, if the sac should continue hard, a warm poultice of sicuta leaves and camphor is recommended for discussing the induration. A bit of leather covered with mercurial plaster is also found useful for this purpose.

As soon as the object of this application is attained the wound is to be filled with a small quantity of lint dipped in the vinous tincture of opium, and the whole covered with a piece of adhesive plaster. Under this treatment the suppuration diminishes, and the matter discharged begins to lose more and more the character of pus, and to approximate to that of mucus. The secretions may be corrected by dressing the wound with lint covered with red precipitate ointment and on removing the dressing daily, the sac should be injected with a weak solution of the sulphate of zinc (2 grains to the ounce) made lukewarm, and a small quantity may at the same time be dropped into the nasal angle of the eye.

If the treatment has been successful, we frequently find that the lachrymal canal and the nasal duct have of themselves become permeable, and the healthy functions of the parts restored, with the exception of the opening, to which such dressings are to be applied as shall induce it to close, but it is exceedingly rare in native practice to meet with a case in which such treatment is indicated. The patients generally pre-

sent themselves with *fistulæ lachrymales* of long standing.

II. The indications of *treatment for the chronic* form of inflammation consist in applying leeches occasionally over the internal canthus, and adopting the other antiphlogistic measures already alluded to. Such treatment combined with counter-irritation, and attention to the general health and regulation of the diet, will generally prevent the supervention of that state which is properly termed fistula. In scrofulous and debilitated habits it will be necessary to administer tonics, as quinine, and preparations of iron. Where the digestive system is at fault it will be proper to administer alteratives as the Plummer's, or the blue pill, followed by laxatives on the following morning, enjoining exercise and change of air.

When all appearance of inflammation has been subdued, the obstruction may continue with increased secretion, the sac becoming distended, and requiring occasional pressure for its evacuation. Should these symptoms continue, the treatment recommended by Scarpa may be advantageous. Astringent washes or stimulating ointments may therefore be employed. With this view Janin's, or else the citrine ointment may be applied along the lids, melted, in about the bulk of a hemp seed, or the red or white precipitate of mercury ointments may be used in the same manner. Astringent lotions are best employed by instilling a few drops on the inner canthus, whilst the patient is

recumbent, and permitting it to be absorbed. The patient should press out the contents of the sac once or twice in the twenty four hours, this should be done previous to dropping the lotion into the eye. Such measures will succeed generally in removing all unpleasant symptoms connected with the complaint, leaving the patient with the slighter inconvenience of an occasional accumulation of tears in the inner canthus, and they may occasionally flow over the cheek. Where suppuration and spontaneous bursting of the sac are inevitable, an early opening should be made, and the case treated precisely in the same manner as for real *fistula* of the sac. Much greater mischief would result from permitting the ulceration to proceed than by practicing an early opening. It now remains to consider the remedial measures which are adopted for the cure of the *fistulous* stage of the disease which is properly designated.

III. FISTULA LACHRYMALIS.—Previous to submitting the patient to an operation for fistula lachrymalis, it will be necessary to direct our attention to the state of the constitution, and to employ soothing and antiphlogistic measures.

Two very different modes of operating are at present advocated, the one by Continental Surgeons on the authority of Baron Dupuytren by means of the tube or canula ; the other which is more preferred by English surgeons with the common stylet. I shall endeavour to give an impartial view of both.

Operation with the canula and stylet.—The operation of Dupuytren is accomplished with facility and expedition, the pain being inconsiderable. Indeed to use the words of Dupuytren, the patient is generally unaware that anything has been introduced into the lachrymal sac.*

Fig. 2, of plate XI, represents the instrument consisting of a canula of 8 or 9 lines for the adult and five or six for children, and a stylet. The stylet when used is inserted into the canula, which it should accurately fit, and is of finely polished steel.

The incision into the lachrymal sac is made in the usual manner with a sharp pointed bistoury, between the tendon of the orbicularis and nasal angle of the superior maxillary-bone, and the canula, mounted on the stylet, is introduced into the nasal canal. The stylet is then withdrawn, and the canula allowed to remain in the nasal canal with its head resting on the lower part of the lachrymal sac. The wound generally heals by first intention. To ascertain the accuracy of the operation the nostrils are closed, and the patient is desired to make an effort of expiration, when the air passing along, the canal escapes above with a hissing sound. If again the nasal passage be left full, and the action of blowing the nose expel blood or matter by the nostril, the counter proof of free communication is obtained.

Case 1st—a fine boy received a violent kick from a

* Lancet vol. 1 of 1832-33 page 609.

horse, by which the nasal bones and the nasal portion of the superior maxillary-bone were fractured and driven inwards, the nasal canal injured, and ultimately obliterated.

The poor little fellow had suffered most severely for several months, the sensibility of the parts being most acute. The redness of the conjunctiva, and discharge of tears were considerable. He suffered from head-ache. There was likewise much swelling of the eye-lids, and the nostril was dry. There was a cicatrix, and deep indentation of the nose, fistula lachrymalis having been the consequence of the injury. In this condition he was brought to me, the integument opposite the lachrymal sac being highly erysipelatous and the fistula discharging purulent matter, mucus, and tears. After a short process of antiphlogistic treatment, with soothing local applications the operation was accomplished, the nasal canal was found to be quite impervious, and it was necessary to force the canula through; where it was allowed to remain. The wound healed in a few days and the child was perfectly cured.

I have thought it proper to give this review of Dupuytren's practice with the tube; nevertheless it must be acknowledged that we have no opportunity of watching the result of a large number of cases in hospital practice, at remote periods after the performance of the operation, and until we are in possession of such correct data it would be dangerous to inculcate the practice as a general one. It will be preferable to con-

fine it to cases of entire obliteration of the nasal ducts, such as the case I have given, whether that obliteration has originated from morbid deposition, or is the result of severe mechanical injury. I proceed now to describe the more generally adopted method of operating.

The operation with the style is performed in the following manner.

Guided by the firm ligament of the orbicularis palpebrarum, immediately below it, and above the sharp ridge of the orbit, a sharp pointed narrow bistoury is to be plunged into the sac and carried on into the nasal duct, by conducting the knife in a direction downwards, slightly backwards, and a little inwards, in the direction of that passage, the upper orifice of which is situated immediately below the tendon of the orbicularis, as it proceeds to be attached to the nasal process of the superior maxillary bone. A probe is then conveyed along the anterior face of the bistoury, and insinuated into the duct by a slight degree of pressure and a rotatory motion. The bistoury may then be withdrawn. The passage having been gently dilated by the probe, that instrument is to be withdrawn and replaced by a style, made of silver or pewter and somewhat longer than the duct, having a flattened head placed obliquely to the body of the style (Plate XII, fig. 1.) They are now made with a groove along the body of the style, which may supercede Dupuytren's canula. The size of this instrument should be rather small, and

gradually increased. Considerable irritation is often induced by its first employment, which is to be met by soothing and antiphlogistic measures: much will depend on the gentleness and dexterity of the operation. So soon as the parts have become accommodated to the presence of the style, it may be worn not only without inconvenience but with considerable comfort to the patient. The head of the style is not at first to be pushed down in immediate contact with the external incision, otherwise it might fall into the sac and be extracted with some difficulty. A piece of Court plaster should be applied so as to approximate the edges of the incision. The style is to be suffered to remain for four or five days; raising it a little daily in order to allow the wound to be inserted under the head of the style. After this period the style may be daily removed, cleansed, and reinserted, previously injecting the canal with tepid water or some gently stimulating injection. The tears and mucus will be found to descend by capillary attraction along the sides of the style. The head of the style is usually covered with black sealing wax, and occasions no unsightly appearance. The fistulous opening gradually contracts around the style. When a sufficient degree of dilatation has been produced by gradually increasing the size of the instrument, and the surgeon has satisfied himself of the complete permeability of the passage, it may be withdrawn and only occasionally introduced. By this means an opportunity will be afforded for the exter-

nal fistulous aperture to contract. Under favorable circumstances a permanent closure may now take place and the disease be completely cured. In other instances a small opening remains. In such cases a small gold probe should be introduced every evening with a view to preserve the permeability of the duct. It has been recommended to denude the edges of the aperture with a view more effectually to induce its complete closure.

General treatment must be at the same time attended to, indeed in this tedious disease it must be varied, and regulated according to the degree of obstruction of the duct, the condition of the sac and its walls, the subjacent bone, and general habit of the constitution. In slight obstruction of the duct it is merely necessary to introduce the probe without leaving any style in the passage, and healing up the wound.

Fig 2. of Plate XII. represents a curved probe used by Laforest and preferred by Mr. Morgan. It requires some practice to employ it with facility. No force must be used in introducing the instrument, "the point of which having been carefully fixed in the lower opening of the duct, after being carried under the inferior turbinated bone, is to be gently pushed upwards into the sac, through the stricture, by depressing the handle of the probe or sound, keeping the convex part next to the handle upwards; then, after having established a free passage through the canal from below, I generally inject tepid water from day to day, by means of a small catheter, introduced in the same manner as the sound

(Plate XII, fig. 3.) and attached to an Anel's syringe (fig. 4). By following this plan, suppuration may sometimes be prevented, but at all events a fistulous opening in the face is prevented, if the disease is confined to the membrane, (although an abscess may have formed in the sac,) in consequence of the prevention of any accumulation there, from frequent injections."*

It has been recommended by Dupuytren when repeated inflammation of the sac has taken place, and when the former plan of treatment has failed, to expose the sac and destroy its surface by the *potassa fusa*, but this can seldom be requisite. As to the perforation of the *os unguis*, such a measure is altogether unjustifiable and exploded.

Sometimes the orifice of the fistula is surrounded by small fungous vegetations, these may be excised by curved scissors or cauterized with the *argenti nitras*.

It may occasionally happen in protracted cases where sinuses have formed, that a portion of the superior maxillary bone becomes denuded and carious. This will be indicated by the state of the fistulous openings and the fungous granulations already alluded to, and by the discharge of an ichorous matter, with deep redness of the surrounding integuments. The diagnosis will be established by the insertion of a probe, this condition should be treated by the injection of the *solutio argenti nitratis*, and by dressing the wound with lint moistened with the tincture of myrrh.

* Morgan's lectures for diseases of the eye, p. 220.

In cases of *closure of the puncta*, *uncomplicated* with any affection of the sac, a pin is to be introduced into the *orifice* of the punctum; a very fine punctum probe is then to substituted, and carried inwards along the canal to the sac. Attention is at the same time to be directed to the healthy state of the conjunctiva.

SEC. III.—ON THE TREATMENT OF MORBID AFFECTIONS OF THE DIOPTRIC MEDIA OF THE EYE.

Sub-sec. I. On cataract.—Opacity of the crystalline lens and its capsule, constituting what is strictly termed cataract,* may be situated either in the anterior portion of the capsule, in the lens itself, or in the posterior part of the capsule. These parts may be separately or jointly affected. In a practical point of view the morgagnian cataract may be safely excluded as a distinct variety, indeed its separate existence is very doubtful. We can scarcely suppose this small portion of fluid to be opaque excepting in conjunction with opacity of the crystalline and capsule.

Causes of cataract.—Until very recently the cause of lenticular cataract was completely unknown, and much obscurity attended the subject as respects opacity of the capsule. A more perfect acquaintance with the optical functions of the eye, and the mechanism of

* From καταρακτα vel καταρακτης ab καταρασσω to break or disturb, vision being broken, or disturbed as the disease advances.

of the Dioptric media, has thrown considerable light on the pathology of cataract. Science is indebted to Sir D. Brewster,* Dr. Mackenzie,† Professor Sanson of Paris,§ Dr. Staberoh of Berlin‡ and other modern writers. Diagnosis is likely to derive advantage from the method of examining the seats of incipient disease *catroptically*.

We are now clearly able to state that capsular cataract owes its origin to a chronic form of inflammation, in which the lens sometimes participates, minutely described by Professor Walther.|| The minutely injected vessels under inflammation are arranged in arches, and exhibit the most beautiful vascular network. We have very rarely an opportunity of witnessing the disease in its incipient stage, although in many instances we discover *capsular* and *soft* cataract to have arisen under manifest congestion of the organ with unusual determination to it.

Very different is the proximate cause of *lenticular* cataract. The disease has hitherto been supposed to originate in defective nutrition of that body, a sort of *necrosis* or gradual decay of its texture, independently

* Sir D. Brewster's treatise on optics and in the London Medical Gazette 1837, 38 p. 523, also Edinburgh Journal of Science No. 1 p. 77 and Philosophic trans : and reports of proceeding of the British Association.

† Dr. Mackenzie's practical Treatise, and London Medical Gazette page, 105 for 1837-33.

‡ Quoted in the Medical Gazette by Dr. Mackenzie.

§ Do. do.

|| Abhandlungen aus den Gebiete der protischen Medicin vol. I, p. 53 Landshut, 1810.

of any inflammatory action ; but such an explanation is very unsatisfactory. Sir David Brewster by a series of experiments on the crystalline lenses of animals has been led to discover that the capsule of the crystalline is a membrane which performs the functions of *endosome* and *exosome*, keeping up a due proportion between the aqueous element in the aqueous chamber, and the lens. " Even in the dead state this membrane imbibes distilled water so greedily, that the lens which imbibes it becomes quite soft, expands, and bursts. Viewing the capsule in this light, there can be no doubt that *soft cataract* arises from an excess of aqueous humour imparted to the lens through the capsule, and that *hard* or *dry cataract* arises from a defect of *water* in the aqueous humour, or an *excess* of *albumen*." Sir D. Brewster considers *presbyopia* or *long sightedness* which occurs so frequently between the ages of 30 and 40, to be but the commencement of those changes which so often, if neglected, lead to hard or dry cataracts. These changes commence generally in the margin of the lens, and if they do not advance favorably and uniformly along the circumference of the lens, the fibres, and even the laminæ separate, or cease to be in *optical* contact. The plan of the present work prevents my entering further upon this subject.

I might here enter into a long description of the different kinds of cataract, together with the *diagnosis* and *prognosis*, but such an undertaking would be superfluous, since all requisite elementary information is

to be found in most of the standard works on these subjects. I proceed therefore to offer the following practical observations on the different operations.

Preliminary considerations respecting the removal of cataract by operation.—When both eyes are affected with cataract, and both nearly *mature*, ought both to be operated on at the same time? To this question I should decidedly, from experience, reply in the negative, because we know not what circumstances may occur inducing serious accident or dangerous inflammation, and that in all instances, and with all operations it is infinitely preferable to allow the patient two chances instead of one. In *extraction* this rule is especially important, inasmuch as double extraction exposes the eye to greater risk. But if we operate only on one eye, and allow it to recover, we may possibly observe, in the course of the operation and recovery, some particulars which will be essentially useful to us in conducting the second operation, or will even lead us to select a different and more suitable method of operation for the second eye.

It is highly important in all practicable cases for the patient to undergo a certain course of preparatory treatment. But with the natives of India it is neither practicable nor expedient, from their aversion to any thing of the kind, and their proneness to lose confidence. In the wealthier natives it is possible to adopt a preparatory treatment, but with the lower orders it is scarcely requisite, from their very abstemious mode of life. A

long and tedious preparation is seldom requisite even in the robust European, excepting where there is an undue plethora, or local determination. No precise rules however can be prescribed. In each individual case we must be influenced by the peculiarity of constitution and condition of the patient. In some, venesection may be requisite, and should the blood prove sizy it would be highly injudicious to proceed to an operation. Purgatives and in some an alterative course may be necessary and a strict antiphlogistic diet a fortnight previous to operating.

Immediately previous to operating the patient should avoid all articles of difficult digestion.

In cases of congenital cataract ought the operation to be delayed until the patient has attained an age sufficient to enable him to give his assent, or ought it to be practised during infancy? It is greatly preferable to operate in infancy. About the age of from eighteen months to two years, the parts have attained a degree of resistance, which enables the surgeon to operate with greater precision than at an earlier period, yet the capsule is not so tough and coriaceous as it becomes at a later period, and especially after the lens (as often happens in congenital cases) is completely absorbed. If the operation be delayed, the eyes, having no distinct perception of external objects, acquire such an inveterate habit of rolling, that for a long time after the pupil has been cleared by an operation, this irregular movement can with great difficul-

ty be overcome. The retina, likewise, by a law common to all the structures of an animal body for want of being exercised, loses power. I have however inserted in a note at the end of this essay, some cases of congenital cataract, operated on at a very advanced period of life, illustrating not only the preservation of the powers of the retina for a very long period, but likewise the fact of the voluntary efforts over the muscles and a very useful degree of vision being attained. They by no means, however, invalidate the general rule which should guide us in operating on all congenital cataracts at an early period, whenever they are presented to us.

Extraction of the cataract.—In considering this particular kind of operation, which I proceed first to describe, I would premise that although I consider it infinitely superior to any other mode of removing the cataract where the cases are judiciously selected, and the operation skilfully performed, yet it must ever be insisted on as an important rule of practice not to select one operation with a view of practising it exclusively, but to consider the peculiar circumstances which give a preference to the one or the other, and to select in each instance that which is best suited to the particular form of the complaint ; for each method has its advantages, and is eligible under certain circumstances. In the upper provinces of India, *extraction* succeeds better than in Bengal. In the natives of the latter province the deepness of the orbit, smallness of the anterior cham-

ber, their weak constitutional powers (owing to the poorness of their diet,) render the reparative effort so weak as to hazard the union of the incision of the cornea, making this operation peculiarly inapplicable to them. Mr. Egerton whose experience is very great in Bengal, seldom extracts for the above reasons.

The operator should have a good eye; a steady, light and skilful hand; a delicate touch, confidence and caution, and without these essential qualifications he had much better restrict himself to the simple operation of depression, or reclination. The operation of extraction can be resorted to only in adults.

Extraction may be performed either by placing the patient horizontally on his back, or by seating him in a chair. I always give the preference to the former, laying the patient on a couch, because the operator is thereby less dependant on the uncertain aid of assistants, and has better controul over the patient, and there is less danger of an escape of the vitreous humour. The surgeon has the important advantage of holding the upper lid himself, whilst he rests his breast on the patient's head. All that is required of the assistant is for him to depress the lower lid, by placing his finger towards the inner canthus, immediately in contact with the ball of the eye without pressing upon it, and holding the lid steadily against the inferior orbital ridge.

The other hand of the assistant is to be placed under the chin of the patient for the purpose of preserving the steadiness of the head. The assistant must be

aware of one point, which should be decided on between him and the operator before the operation is commenced; viz. to let the lid go before the section of the cornea is completed; and the operator should communicate to the assistant by a sign, as soon as he has nearly finished the section. The fore and middle-finger of the operator's right or left hand as the case may be, should be used for securing the upper lid and *especial* care is to be taken that the operator's middle finger is so placed on the caruncula lachrymalis to prevent the eye from rolling inwards, otherwise he might find it impossible to complete the incision. The operator should be seated at a convenient height behind, resting the hand with which he operates on the patient's temple, and his elbow on his thigh or knee. If the operator be not ambidexter, he will find himself very awkwardly situated in operating on the patient's left eye, and in that case he had better reverse the position of himself and assistant, and seat the patient on a chair with an upright moveable back, in the usual way, and the patient is to be requested to look straight up, directly at the operator, who is intently looking over his face. The opposite eye is not to be bandaged, otherwise the direction of the eyes of the patient cannot be so well regulated. No general pressure should be permitted either by the operator or the assistant, although the fingers are to be dexterously employed in regulating the movement of the eye-ball, whilst, at the same time, the eye is to be fully and clearly exposed. A

clear light should be allowed to fall on the eye to be operated on, which should be near a northern window.

The pupil should on no account be dilated by the belladonna. Otherwise the edge of the iris will fall on the knife, before, or even after it has completed the punctuation—see Plate XI, Fig. 3.

The operation divides itself into three periods. In the first the incision of the cornea is effected. In the *second* the anterior hemisphere of the capsule is opened, or rather destroyed as much as possible. In the *third*, the exit of the cataract, or the extraction properly so called, is accomplished. The knife should have a very keen edge, and become gradually broader and thicker from its point backwards. It cannot be too sharp, and its point must be very acute.—Plate XI, fig. 4. Its point must be very acute. The point is double edged to the extent of a line. It should be well oiled previous to using it.

1st. Period.—The patient being placed in the position described, the lids secured, and the necessary instrument and bandages adjusted, the surgeon ascertains the steadiness of the eye, by gently touching the globe with the extremity of his finger. The cornea is to be punctured about a line from its margin, and near its transverse diameter, the point of the knife being entered midway between the margin of the cornea and the edge of the pupil, and directed towards the centre of the eye, lest it should enter between the laminae. The knife is then carried along the anterior chamber, with its

side parallel to the iris, and its point is brought out at that part of the cornea exactly opposite to where it entered ; the transfixion is thus accomplished, and by pushing the knife steadily and cautiously forward without any sawing motion, a semicircular section is effected. The section should be something more than a semi-diameter, nine sixteenth of the circumference should constitute the extent of the segment.

In traversing the anterior chamber the operator should be very particular in directing his attention solely to the point of *counter-punctuation* ; by so doing the point of the knife is sure to follow, whereas, if he allows himself to be diverted by any other object, he will very probably miss his aim. The moment transfixion is accomplished the operator has complete command over the eye, and all pressure should be taken off. The assistant should immediately withdraw his finger. In pushing the knife forward to complete the section, the handle of the knife is to be kept *well back*, so that the extremity of the blade may avoid touching the nose as it advances ; and the knife should be lightly raised upwards, and the fore finger of the operator's other hand pressed lightly on the cornea, thus holding the cornea as it were between the surface of the knife and the finger. These points are most important ; the raising of the knife saves the iris from coming in contact with its edge, whilst the cornea being fixed between the finger and edge of the knife nothing can intervene, and the iris must remain unin-

jured. If the aqueous humour has been entirely retained until now, the knife may be turned a little on its axis, so as to allow the fluid to escape, otherwise the pressure of the knife on the aqueous humour might burst the hyaloid membrane, particularly if that membrane is weak as it often is in advanced life, and thus cause ejection of the vitreous humour. The instant the section is completed the knife is withdrawn and the lid allowed to drop, covered for a few minutes with the hand, till all spasmodic action has subsided and the pupil dilated. The chief danger so far as depends on the dexterity of the operation, is over, and the patient should be told so. The light of the apartment ought now to be moderated.

2d. Period.—So soon as the patient has had time to become composed, and that the eye appears perfectly tranquil, for there is now not the slightest necessity for hurry, the eyelids are to be gently raised, without bringing the points of the fingers over the edges of the lids, and a common silver, or the curved needle is to be introduced for the purpose of making a crucial opening into the capsule; a *slight* degree of pressure ought at the same time to be made so as to cause the cataract to advance towards the cornea, and the pupil to yield gradually to that advancement. By this means the capsule will be more freely exposed to the point of the needle.

3rd. Period.—Very gentle pressure is now exerted on the globe of the eye, in order to force out the lens; indeed the pressure which was used during the 2d pe-

riod of the operation if continued, is generally followed by the exit of the lens, but it will be more advantageous to pause for a short interval. Should the lens not readily pass out through the wound of the cornea, it can be removed from the anterior chamber by a small scoop which is usually attached to the opposite extremity of the same handle in which is fixed the needle for opening the capsule. Any remaining opaque substance should likewise be removed with the curette or scoop. Before closing the eyelids, the cornea ought to be carefully adjusted, any matter lodged between the divided surfaces removed, and the margin of the lower lid so placed as not to disturb the flap. The eye is now allowed to rest.

When the patient has recovered somewhat from the confusion arising from the admission of light into the eye, the opposite eye may be closed, and the patient permitted to open that which has been operated on with his back to the light to ascertain whether he sees. Having satisfied his anxiety on this point he should be put to bed, or allowed to return to the same horizontal position on the couch, and directed to close the eyes without force, as though he were asleep. Before finally closing the lids, however, the eye should be again turned to the light, and the surgeon should repeatedly and gently rub the upper lid over the surface of the eye ball, raising the lid, and rapidly examining the appearance of the pupil and state of the flap. Having ascertained these points, the patient is to be desired to

look up, and the eyes are then finally closed with court plaster.

After Treatment.—After the operation the application to the eye should be light, some carded cotton is the best. The room is not to be rendered too dark, but kept perfectly quiet, in order to avoid all sudden alarm or starting. Low diet, complete rest, and silence must be strictly enjoined, and in the event of violent pain supervening, the most active measures should be adopted for subduing inflammatory action, regulated by the nature of the ophthalmia and the principles applicable thereto. The purulent form will require much less active measures. The eye-lid should not be raised for at least three days. No laxative should be administered for forty eight hours after the operation. The lids should be gently washed with tepid water and a soft rag, to remove, as much as can be done with safety, the incrustations. Each time the dressing is changed, the lower lid should be drawn a little downwards, to allow of any lachrymal secretion or aqueous humour escaping which may have accumulated behind the lids.

Modifications of extraction according to the varieties of cataract.—1. If the eye to be operated on is more than ordinarily prominent, the incision ought not to be made at the lower edge of the cornea, lest the lower lid should intrude into the wound, and prevent it from healing by the first intention. The incision should be either at the temporal or upper edge of the cornea.

2. It sometimes happens that the cornea is not only remarkably flat, but the iris appears to project forward in the anterior chamber, forming a convex instead of a plain surface. In cases of this description the anterior chamber is so small that if any attempt be made to complete the division of the cornea by the semi-circular incision, it will be found extremely difficult, if not impossible to carry the knife from the temporal to the nasal edge of the cornea, without wounding the iris. Under such circumstances, therefore, it is advisable to include only one-third of the cornea in the first incision, and afterwards to enlarge the aperture by means of Daviel's scissars or a curved knife.

3. In cases of floating cataract, such as the cystic, of capsular cataract, and of cataract combined with dissolved vitreous humour, it is not necessary, and often not safe, to extend the incision to a semi-circle. It will be sufficient, under such circumstances, to divide one third of the circumference of the cornea, and through this small incision to extract with the assistance of a hook.

4. In cases of capsulo lenticular cataract it is proper to attempt the extraction of the capsule as well as of the lens. The cornea being divided in the usual way, a needle may be introduced, a little bent towards the point, with which we may attempt to divide the capsule in a circular direction, as near the edge of the pupil as the instrument can be applied without injuring the iris. The part included within the circular divi-

sion may sometimes be brought away on the point of the needle, but if this cannot be done, it should be extracted by means of a pair of small forceps, and then the lens is to be removed as in ordinary cases. Or, it may be removed by the tooth-bladed forceps of Beer.

The posterior capsule of the lens may be sometimes known to be opaque, from the history of the case ; or immediately after the lens is removed, we observe that there still remains an opacity impeding vision. If we are satisfied that this opacity consists neither in opaque shreds of the anterior half of the capsule, nor in some portion of the soft exterior substance of the lens retained (as it sometimes is) in the eye, then we may conclude that it is the posterior hemisphere of the capsule in an opaque state. The best plan in such a case, is to allow the eye to recover from what has already been done, and by a subsequent operation with the needle, to endeavour to remove the opaque membrane out of the axis of vision. Some, however have recommended that we should immediately proceed to destroy, and if possible to remove the posterior half of the capsule. This has been attempted by means of a barbed or hooked needle.

Accidents during or after extraction.—Where the case for extraction has been judiciously selected, on an eye in every respect healthy, a transparent cornea, the anterior chamber of a proper size, the pupil regular, the iris steady, and not protruded, and the cataract solid,

and not adherent to the iris; and where the operation, has been skilfully performed according to all the preceding principles laid down, accidents and failures are seldom likely to occur; and where they do occur it is to be feared the eye will too frequently be lost do what we may. If extraction of the cataract cannot be performed successfully, it had better never be attempted; nevertheless as uniform success belongs to no one it is proper to give a brief account of the most approved methods of alleviating the different accidents which result either from a wrong selection, from errors on the part of the operator, or from unforeseen circumstances.

1. The spirting out of the aqueous humour before the counter punctation is effected is one of the most common accidents during the first period of extraction. The iris in consequence loses its support, immediately falls forward, and under the edge of the knife. By raising the handle of the knife, upwards, and pressing with the point of the finger, the iris may retire, when the knife may be carried rapidly across the anterior chamber, and the action be completed, but if the iris does not retire on the pressure of the cornea, the knife must be withdrawn, and either the operation deferred to a future period, or a small probe-pointed knife introduced through the aperture which has been made, pushed gently through the anterior chamber to the nasal edge of the cornea, and over the end of it an opening made with another knife so as to allow it to come through, after which the incision is to be finished

exactly in the same way as if the sharp pointed knife only had been employed."

"2. When the point of the knife reaches the nasal edge of the cornea, the operator occasionally finds it difficult to bring it through, in which case he may derive advantage from pressing the cornea against the knife with his finger-nail. In other instances, the point of the knife is seen to bend to one side, so that it is impossible to perform the counter-punctuation in the ordinary way. When this is the case, the knife is withdrawn and the operation postponed, or what is preferable, the cornea may be opened on the nasal side with another knife, and then the knife which is already across the anterior chamber may be carried through this opening, and the section completed.

3. Too small a section of the cornea is a very frequent occurrence, in consequence of the operator bringing out the knife at too great a distance from the nasal edge, and perhaps considerably below the equator of the cornea. In this case the incision must be enlarged to a semi-circle by the aid of Daviel's scissars which are so bent that the one pair serves for dividing the temporal side of the right eye and nasal side of the left, and the other pair for the temporal side of the left and nasal side of the right. Rarely will the incision require to be enlarged at both extremities, but upon no account is the operator to proceed to the second and and third periods of the extractions if he is conscious that the section of the cornea is less than a semi-circle.

Loss of vitreous humour, severe pressure on the iris, and destructive inflammation, are the consequences to be dreaded from forcing a large cataract through a small incision. Resting the scissars on the back of the finger which depresses the lower lid, and opening them a little, the one blade is to be passed under the middle of the flap of the cornea into the anterior chamber, the other remaining external to the cornea; the instrument is then to be carried close to the temporal or nasal edge of the cornea, according to circumstances, and with a single stroke the incision is to be enlarged to the requisite dimensions."

4. When proceeding to the third period of the extraction the operator should not only satisfy himself that the incision is of sufficient dimensions, but likewise that the capsule has been well divided by the needle, and should there be any impediment to the advance of the lens notwithstanding, by moderating the light, and carefully increasing the pressure on the lower part of the eye-ball, the lens will probably advance, and make its exit in the usual way. Impediment sometimes arises from unnatural adhesion between the lens and the capsule, and is to be remedied in the following manner. The operator is to continue the pressure till the lower edge of the lens appears in view, he is then to introduce a thin sharp curette through the pupil, under and behind the lens, and by the motion of the instrument from right to left, to separate the capsule with the lens enclosed, from the hyaloid,

membrane. A hook is then to be introduced, and the lens and capsule extracted. This will scarcely be effected without some discharge of vitreous humour, but certainly less risk attends this mode of procedure than that of forcing out the cataract by continued pressure.

5. It sometimes happens that the lens falls in pieces and part remains behind the pupil. In this case if the operator rubs the eye gently through the medium of the upper lid, and then opens the eye, he will generally find that the fragments have advanced into the anterior chamber. They will readily escape on lifting the flap of the cornea with the curette. But nothing beyond the gentlest efforts should be used, for any small particles which may be left will dissolve in the aqueous humour.

6. An escape of vitreous humour may take place. This is most frequently owing to weakness of the hyaloid membrane from age or from disease. If the escape of the vitreous humour commences before the lens has been removed, all pressure on the ball of the eye must be immediately discontinued, and a small hook should be introduced to lay hold of the cataract, as speedily as possible. The eye is then to be closed, and very gently rubbed through the medium of the upper lid, in order to re-place the iris, which is very apt, when there has been any escape of vitreous humour, to protrude through the wound of the cornea. The cornea heals more slowly than usual after this

accident, the cicatrix is broader, the pupil not unfrequently destroyed, and vision less perfect. If only a fifth or even a fourth of the vitreous humour is lost, vision may not be very materially affected. If a third is lost we cannot calculate on any useful degree of vision. If more than a third is evacuated the pupil generally closes, and the eye-ball becomes permanently atrophic.

If the capsule has been opened in a previous operation, with the view, for example, of softening a hard cataract previously to attempting to divide it, or displacement has been ineffectually performed, and the operator proceeds to extraction, he will almost to a certainty encounter a dissolved hyaloid membrane, and of course an evacuation of vitreous humour.—(Mackenzie, p. 517 et seq.)

7. It has already been mentioned, that immediately after the operation, any protrusion of the iris may generally be reduced by rubbing the lid, and suddenly exposing the eye to the light. Slight efforts with the curette may be required, and should this also fail, a small snip may be made in the protruding portion of the iris, when it will often return almost of itself into the eye, in consequence of the draining away of the aqueous humour which was lodged behind it.

The iris often protrudes about the fourth day, from the supervention of inflammation; or sometimes from having made the incision too close to the sclerotica. The edges of the wound are observed to gape, and are

somewhat swollen and everted. The iris soon begins to shew itself between the lips of the wound, and as the aqueous humour accumulates behind it, this staphyloma iridis increases. At the same time, the protruding portion of the iris inflames and is united by effused lymph to the edges of the wound of the cornea. The conjunctiva and sclerotica redden, the discharge of tears is frequent and irritating, the patient feels as if some foreign body of considerable bulk were lodged beneath the eyelids, the eye and supra-orbital region become painful, the skin dry and hot, and the pulse quick. No direct attempt to reduce this protrusion need be made. Snipping it with the scissors, however, can do no harm. Belladonna is not to be used as calculated to favor the protrusion. The strictest anti-phlogistic treatment will be necessary, and the protruding iris should daily be touched with a sharpened pencil of lunar caustic. It is very seldom however that the eye will be preserved from the violent inflammation which it suffers. In more fortunate cases, the iris will be more or less drawn towards the cicatrix, and partial or complete closure of the pupil will result, affording often a favorable case for the formation of an artificial pupil.

8. Where the flap of the cornea has been carelessly adjusted, the edge of the wound sometimes unites in so imperfect a manner, as to be unable to withstand the pressure of the aqueous humour. The consequence is, that a thin semi-transparent membrane, having the ap-

pearance of a vesicle distended by aqueous humour protrudes, giving rise to the sensation of a foreign body in the eye. If this membrane, which has generally been regarded as the lining membrane of the cornea, be punctured, the tumor formed by it subsides; but speedily reuniting it is protruded as before, so that it is better to snip it off close to the original edges of the wound, and keeping the eye closed for several days; endeavour thus to procure a more perfect union. The cicatrix in every such case will be very considerable.

9. Inflammation is the consequence most to be dreaded after the operation of extraction. It is too frequently the result of attempting by force, haste, or undue interference, what ought to be effected by tact and skill. The principles of treatment need not be insisted on here, after what has been said on inflammation generally, and on the after treatment. Where closure of the pupil is threatened the Belladonna is likely to be serviceable; but if there appears to be any tendency to protrusion of the iris through the wound, it ought to be avoided.

β *Modification of extraction through the cornea.*—There are certain cases in which a section of only one third of the circumference of the cornea is not without its advantages, either rupturing the capsule through the cornea some days previously, or just before making the section. I have myself occasionally done so with success, but on the whole these operations had better be confined to arid *siliquose cataracts*, to those in-

stances either of attachment of the iris to the lens, or where on attempting to cut up a lens, it is found too hard; or, in depressing it rolls round the needle or has accidentally fallen into the anterior chamber, in which latter the operator had better transfix the lens, and entrusting the needle to a steady assistant, accomplish the section of the cornea, piercing the lens and cornea together with the extraction knife.

Such operations are easily accomplished by an experienced hand. A hook or a small pair of toothed forceps is required for seizing the cataract, and sometimes a pair of sharp iris scissars. Mr. Travers and others recommend even for *soft* cataracts a *quarter section* of the cornea, dipping the point of the knife into the capsule. The exit of the fluid cataract may be aided by the curette.

γ THE OPERATION OF DEPRESSION OR "RECLINATION."

The patient, having the opposite eye covered, is seated on a low chair, in front of, and near to, a north window, in order that clear light may be obtained. His head is supported on the breast of an intelligent assistant standing behind. The upper eyelid is raised by the assistant's fore and middle fingers of the left or right hand, applied in contact, without pressing on the globe, and the other hand is placed under the patient's chin to steady the head.

The pupil having been well dilated by the previous employment of the belladonna, the curved needle of Scarpa or the lance-shaped needle, well oiled, is introduced a line and half from the junction of the cornea with the sclerotica, and about a line below the equator of the eye, towards the external canthus, with one flat surface looking upwards and the other downwards, in order that in passing through the pars non-plicata of the corpus ciliare it may wound as few of the choroidal arterics as possible. The needle is to held in a light and delicate manner between the fingers and thumb. The opaque lens if solid is entangled with the point of the instrument, and pushed into the lower part of the ball, or, if reclination is preferred, the point of the needle is placed on the upper and anterior part of the lens, and by raising the handle and pushing the point slightly forward towards the inner part of the eye, the lens is removed from the axis of vision, placed inferior to it, and thus the relative situation of its surfaces changed, its anterior surface becoming the upper.

The following rules are to be strictly attended to:—

1. In puncturing the coats of the eye, the point of the needle is to be directed towards the centre of the vitreous humour, thus completely avoiding the lens.
2. The instrument is to be introduced at a distance not greater than two lines, or less than one from the cornea; if this rule is not attended to the retina on the one hand, and the ciliary processes on the other, will be

endangered. 3. In order to avoid the iridal artery, the instrument is to enter about a line below the transverse diameter of the eye. 4. As soon as the needle has penetrated to the extent of one-fifth of an inch, the instrument is on no account to be thrust deeper into the vitreous humour. 5. In depressing the cataract, the needle must on no account descend below the horizontal position, or else the cataract will be pressed through the retina, "and vision destroyed by the very attempt which we make to restore it." 6. For the space of a minute or two the needle is to be kept in contact with the depressed lens, and should it rise, the depression must be repeated in the most cautious manner. 7. It is desirable that the capsule should be displaced along with the lens. This is not always accomplished; the capsule is merely torn by the needle, and its shreds left attached to the circle of the ciliary processes. These shreds, being highly elastic will roll themselves up, and prove no impediment to vision, unless inflammation comes on and renders them opaque, in which case they will form a secondary capsular cataract.

Modifications of the above operation according to varieties of cataract.—1. When the cataract is found to be friable or soft, the operation of division must be substituted by carefully lacerating the anterior hemisphere of the capsule, and the needle withdrawn.

2. It not unfrequently occurs in capsulo-lenticular cataracts, that on penetrating the capsule, the fluid por-

tion of the lens bursts into the aqueous humour like a cloud obscuring for a few moments the operation. This soon subsides, and if there is a central nucleus it is soon perceived, and the operation of depression may then be proceeded in.

3. Cases occasionally occur of adhesion of the capsule to the edge of the pupil. When the adhesion embraces the whole circumference of the pupil, to separate the capsule is almost impossible, so that as far as the capsule is concerned, the formation of a central opening to it is all that we should attempt. The lens is to be displaced or divided, as its consistence may indicate.

4. Instances not unfrequently happen in which the cataract repeatedly rises up, whenever the depressing movement is discontinued. Such an occurrence has been described to a greater degree of adhesion than natural between the crystalline capsule, and the aqueous humour, and has been designated *elastic cataract*. In such a case, we allow the cataract to resume the situation whence it had been forced by the application of the needle ; we then carry the instrument over the upper edge of the lens and down behind the posterior hemisphere of the capsule ; we move it upwards and downward, so as to destroy the adhesion of the capsule to the hyaloid membrane, bring up the needle from under the cataract into the posterior chamber, and then repeat the displacement as before.—(Mackenzie p. 506.)

After treatment.—The eyes are to be shaded by means of soft carded cotton fixed by a roller passed round the head, or pinned to the night cap.

2. The food is to be light, and such as requires no mastication. The patient should be kept in bed or on a couch, in a moderately dark apartment.

3. After three or four days the eye may be protected from the light by a green shade, but ought not to be employed in examining objects for eight or ten days. After this period the eye ought to be gradually brought into use.

The *Injurious consequences* of this operation arise chiefly from the breaking up of the delicate texture, which fills the globe, or from pressure on the retina. Congestion of vessels, turbid humours, flaccid tunics, and palsied iris too often result. Acute inflammation must follow any unskilful movements of the needle. Slight hæmorrhage into the chambers will be absorbed.

The above operations of displacement may be had recourse to when from diminution of the anterior chamber, adhesions of the iris, a morbid state of the pupil, and the temper of the patient, extraction cannot be attempted. When the cataract is small, it is immaterial how it is depressed; when large, reclinacion should be selected as the safest. (Plate XI, fig. 8 and 9.)

4. *Division for solution of the lens through the Sclerotic.*—The pupil is to be dilated in the usual manner by the application of the belladonna. The needle is introduced in the same situation as for depression. Plate

XI, fig. 9. The edges of the needle should be very sharp ; and its point must be directed towards the anterior surface of the crystalline, as for depression. The entire of the central portion of the capsule must be freely lacerated, to rather more than the natural diameter of the pupil. If the cataract be fluid, its contents will pass into the chamber, and render the aqueous humour turbid ; but if it should be only soft the needle is merely gently moved once or twice through the lens, and having lacerated the capsule, the instrument is to be withdrawn. The absorption of the lens goes on to a certain extent ; we find probably that some of its exterior substance passes through the opening in the capsule into the anterior chamber, and is then completely absorbed.

By cautious proceeding, this operation may be several times repeated. In many of these cases, in which the greater part of the lens is soft, the nucleus remains firm and the size of this firmer nucleus will very much influence the time required for its absorption. Particular care should be taken not to displace the lens by the first operation, otherwise it will bulge against the iris and occasion considerable irritation.

The aqueousmenstruum being secreted chiefly in the posterior chamber, it is not necessary that the lens or capsule should be advanced into the anterior chamber. Monseur de la Garde is of opinion that the removal of the opaque lens, after the capsule is opened up by the needle, is to be attributed as much to the action

of the absorbents of the lens itself stimulated by the pressure of the aqueous humour, as to the operation of the solvent effect of this fluid.*

The cases to which this operation is adapted are all congenital cataracts, in early life especially, and every instance of fluid or soft cataract. It is also applicable to caseous cataracts. The time required for absorption is uncertain; the less inflammation is excited, the more rapidly does the process advance. Inflammation, indeed, seems to be incompatible with absorption, which is explained, partly by the well known fact that over-distention of the blood vessels is always found to be inconsistent with a free action of the absorbents, and partly by this, that even although there may be no evident effusion of lymph behind the pupil, there is always a disposition in internal ophthalmia to such an effusion, and of course a tendency to close up and repair the injured capsule.—(Mackenzie p. 533.)

ε. The operation of division through the cornea, (the *Keratomyxis*) is a very simple one. Fig. 10. The needle ought to be considerably smaller than that used for division through the sclerotica, as it has to operate through the pupil, and often in the eyes of infants. The edge of the needle must be very sharp, the neck round, and of such a degree of increasing thickness as shall fill the wound made by the bent or lancee shaped part, and so. prevent the aqueous humour from escaping.

* De la Garde's treatise on cataract. p. 51 London 1821.

The needle is introduced through the cornea and the capsule and cataract broken up, the pupil is previously dilated by the belladonna, and the dilatation should be continued for some time afterwards. The puncture may be made in any part of the corneal circumference; it soon heals and leaves no cicatrix. The operation can be performed without much disturbance of the organ, and is, like the preceeding operation, applicable when the cataract is fluid, or its consistence doubtful.

‡. *Congenital cataracts.*—The cataracts of infants are always soft and it generally happens that the capsule is opaque, as well as the lens; indeed we usually find that the lens is partially absorbed, and that the capsule has a white shining shrivelled appearance. Such cataracts are only to be operated on with the needle so as to lacerate the capsule and reduce the lens to fragments. The great difficulty is in the fixing of the head, and denuding the eye, so as to get a clear view of the organ; the fissure of the lids is small, and therefore it is difficult to expose the organ clearly.

The child must be placed in the recumbent position with the head upon a pillow, and as we can seldom succeed in opening the lids sufficiently with the fingers it will be best to use the elevator of Pellier, and fix by it the upper lid against the orbit. No pressure whatever should be made on the ball of the eye. The operation may be performed either posterior or anterior to the cornea. More than one operation is generally required. The first causes the solution and absorp-

tion of the lens, and the next operation is with a view to get rid of the capsule; the mode of treating the latter is the same in the infant, as in the adult; the needle is to be carried in front of the capsule and its surrounding connections are to be detached to the extent of 3-4ths of its circumference. When thus detached, it rises up after the needle is removed, and seems to fill the pupil as before; but it shrinks, when no longer connected at its circumference, and is gradually withdrawn below the lower edge of the pupil.

The *After treatment*, must be regulated on the same principles which are applicable to the other operations.

7. *Secondary cataracts*.—Consist of such opacities of the capsule as appear after the removal of the lens, by whatever method that may have been attempted; or a portion of opaque lens may remain in the pupil after either of these operations. Such lenticular fragments will gradually disappear by solution and absorption. If these are large the pupil may be kept under the influence of belladonna. Any opaque capsule which may remain, or which may form subsequently to operations for cataract, must be treated on the principles already described, as applicable to capsular cataracts. Secondary cataracts may also be the result of inflammation of the iris and the consequent effusion of lymph. These are to be remedied by an operation for the formation of an artificial pupil, or by the method before alluded to for treating capsular cataract. Secondary

capsular cataracts are exceedingly tough and elastic, almost cartilaginous ; and their specific gravity, being lighter than the aqueous humour, or vitreous fluid, it is impossible to depress them. Such cataracts ought to be divided by the point of the needle at their lower portion, in order that any remaining shreds which continue attached to the circumference of the capsule, may float out of the axis of vision. But the most satisfactory method of removing secondary capsular cataract is by a section of the cornea, and extraction of the cataract by a hook.

c. *On the adaptation of the eye to different distances and its condition when the lens is removed.*—As the accommodation of the eye to different distances mainly depends on the mechanism by which the crystalline lens is shifted forwards or backwards, and as the removal of that body necessarily deranges that mechanism, I shall conclude the subject of cataract by a few observations on this peculiar office of the crystalline, and on the imperfect substitute which it is generally requisite to employ for the loss of it.

The most distinguished philosophers have entertained different opinions respecting the method by which the eye adjusts itself to varying distances. Some have ascribed it simply to dilatation and contraction of the pupil ; some to the elongation of the eye, by which the retina is removed from the crystalline lens, some to the motion of the crystalline lens ; and others to a change in the convexity of the lens, on

the notion that it consists of muscular fibres. The second and last suppositions scarcely merit a refutation. The elongation of the eye by muscular compression would occasion an alteration in the curvature of the retina, and consequently the centre of the visible direction, and produce a change of place in the image. To my mind it appears evident that the power of adjustment depends in a great measure on the mechanism which contracts and dilates the pupil, as is exhibited in fig. 11 Plate XI. The pupil contracting when the individual is looking on near objects, causes the ciliary bodies attached to the base of the iris, to draw the lens forwards, and, vice versa, the dilatation of that aperture, causes the crystalline to recede and approach therefore nearer to the retina. Dr. Brewster (treatise on optics, and Edinburgh Journal of Science) is of opinion that this adjustment is effected by two actions; one of which is *voluntary* depending wholly on the will, and the other *involuntary*, depending on the stimulus of light falling on the retina. But although we must admit the truth of the general doctrine of the power of adjustment depending chiefly on the shifting of the lens, and although I acknowledge it doubly refracting structure and that its peculiar texture and gradually increasing density as it approaches its centre enables it to correct the spherical observation of light, yet I must think that the loss of this body is not attended with so great a degree of deficiency with respect to these powers of the organ generally, *provided* the

remaining parts of the eye, and especially the transparent media, are in the highest possible state of health. Numerous instances have occurred to myself, where vision has been scarcely inferior, even without glasses, to that which is enjoyed by the best eyes which have never undergone any operation, especially in young subjects, and where there has been the least possible injury consistent with the removal of the diseased lens. I mean particularly in cases of successfully performed division or extraction, where none of the posterior structures have been touched, and a scarcely perceptible curvilinear cicatrix of the cornea remaining. It is chiefly in displacement of the lens, where the hyaloid membrane is more or less broken up, the ciliary processes wounded, or the retina pressed upon by the depressed lens acting as a foreign body, that such very imperfect vision or even total loss of it results. In successful cases we must attribute their distinctness of vision in a great measure to the contraction and dilatation of the pupil, and the power of *attention*, and their sight is capable by exercise of very considerable improvement.

It is to provide against the more or less diminished refracting power of the eye that we avail ourselves of the imperfect substitute afforded by artificial convex lenses, or cataract glasses, with which likewise we have the power of occasionally changing the focal distance by shifting the glass forwards or backwards. They ought not, however, to be too hastily employed. So long as the patient's vision is improving by

the unaided powers of the eye, so long should he refrain from their employment. The glasses should be doubly convex, of the finest crystal, and of about $2\frac{1}{2}$ inch focus for reading, or examining minute objects, and $4\frac{1}{2}$ inches for viewing distant objects. The best test of a cataract-glass is, that it enables the person to distinguish objects placed before him at that distance at which he could see them before he became affected with cataract. It is sometimes necessary to select two glasses of different powers, where two eyes are found after operation to have different points of vision.

SUB-SEC. II.—ARTIFICIAL PUPIL.

Since the time of Cheseldon who first restored vision by the formation of an artificial pupil accomplishing an incision of the iris,* a great variety of methods have been invented, all of them being only different modifications of the three following.—viz. *Incision*,† *excision*‡ and *separation*.§ The last operation which consists in tearing away the iris from its ciliary attachment is attended with such laceration of the ciliary nerves, and blood vessels at their trunks, and consequent hæmorrhage, and generally severe inflammation, that I think

* Philosophical Transactions for 1728, vol. xxxv. p. 451.

† Corotomia from κορη pupil τομή sectio.

‡ Corectomia from κορη pupil εκτομή exsectio

§ Corodielysis from κορη pupil and διαλυσις dissolutio.

it may be set aside. Scarpa* who proposed the operation, acknowledges another inconvenience, viz. that the iris is apt to resume its position again, even in the best cases, becoming, as he observes, *filiform*. Schmidt,† Reisinger, Von Graefe and others have likewise performed and variously modified this operation.‡ But it is now very generally discarded by the best surgeons. I shall therefore confine myself, in the following remarks, to the only two operations which offer a fair prospect of success in all cases where an attempt to form an artificial pupil is expedient.

The operation is requisite on account of central opacity of the cornea, with entanglement of the iris, and entire closure of the pupil, or diminution of that aperture, with concealment of the remainder by dense corneal opacity, where no useful vision can be obtained, even by the daily employment of the belladonna. It is sometimes requisite after extraction of the cataract, either where that operation has been badly performed, the iris having become adherent to the cicatrix of the incision at a distance from the junction of the cornea with the sclerotica; or when closure of the pupil has occurred as the result of inflammation after that operation, though the cornea is transparent.

Previous to undertaking an operation, a careful en-

* Scarpa, Trattato delle principali Malattie degli occhi and translation by Briggæ.

† Schmidt 1802, ophthalmologischer Bib. band 2, strick 1.

‡ Weller on diseases of the eye, vol. ii. p. 65.

quiry must be instituted into the state of the eye, and its general healthy appearance in every other respect, excepting the obstructed vision. The condition of the organ rendering an operation requisite has always been induced by more or less inflammation, generally of a specific character. This must be carefully enquired into, and the present state of the patient's health satisfactorily ascertained. So long as the individual is able to see with the opposite eye, an operation must not be thought of, as the axes of the two eyes will not correspond. The state of the retina must be particularly examined, as to whether it possesses a clearly marked sensibility to light. In most of the conditions of the eye requiring an operation for artificial pupil the eye is able to distinguish between the different gradations of light. The patient will be able to know light from darkness even when the pupil is closed, the capsule and lens opaque, and even where a degree of opacity of the cornea exists at the same time; yet it is possible, from a great quantity of lymph being accumulated in the posterior chamber, and thickening of the iris, that the patient shall be scarcely able to distinguish night from day, although the retina and other internal parts shall be capable of resuming their office when the obstruction to the access of light is removed. Two such instances of restoration to sight are recorded by Pönitz the German translator of Assalini (vide Mackenzie on the eye.) The changes of texture in the iris ought to be minutely examined; if those changes are

confined to the lesser or pupillary circle, the greater or ciliary part remaining free, that circumstance would not be unfavorable; but if the effects of inflammation should be apparent throughout the iris, we may infer that the ciliary body and the other textures in connection with it have suffered also. We should observe whether the iris preserves its smooth and level appearance, or whether it bulges forward, and is elevated into little tubercular projections. If the iris form a convexity in the anterior chamber, and if its surface be puckered and irregular, it has then undergone such serious changes in its texture, that the operation would be unavailing, as the retina will in such cases be found to have undergone changes destructive of its power of conveying the impressions of light. An operation would be equally unjustifiable if there be any varicose dilatation of the blood-vessels, softness, preternatural hardness, dropsy, atrophy strabismus, staphyloma scleroticæ, or the like. If the operation cannot be performed in or near the centre of the iris, and if the operator has a choice of selecting a point behind either the nasal or the temporal edge of the cornea, he ought to prefer the former of these two situations, both as affording a more useful degree of vision, and as occasioning a less degree of deformity. But it is seldom that we have a choice in this respect.*

c. If an artificial pupil is to be formed in each eye, some direct us to make the one at the temporal and the

* Mackenzie's Practical Treatise, p. 556.

other at the nasal edge, alleging that in this way there is a greater degree of correspondence between them than if they were formed in any other situations except in the centre of the eyes. If both pupils are towards the temple, as in Professor Monoir's patient, the Marquis of Beaumanoir* the appearance is far from being natural or agreeable.

d. In all cases in which the lens and capsule are transparent, the artificial pupil must be formed in such a way as to leave these parts untouched.

e. As an artificial pupil generally possesses no power of contracting or dilating, care must be taken that it be made neither too large nor too small. It is remarkable indeed, how useful a very small artificial pupil may prove, as is well illustrated in the celebrated instances of M. Sauvages, operated on by Demours.† In general, however, so small a pupil does not prove very serviceable, while, on the other hand, an artificial pupil much above the medium size, exposes the eye to be constantly dazzled, and is thus rendered comparatively useless.

f. The formation of an artificial pupil ought rarely, if ever, to be attempted in a strumous subject under the age of puberty, more especially if the diseased state of the eye rendering this operation necessary has originated in strumous ophthalmia, independant of injury.

* *Med. Chirurg. Trans.* vol. vii. pp. 305, 309. London 1816.

† *Traite des Malades des yeux.* Planche 46, fig. 1.

After an operation in such a subject, inflammation of the strumous character is almost sure to follow, and will probably destroy the eye. In the course of a few years after puberty, the operation may be performed with less danger.*

Prognosis.—It by no means follows that an operation for artificial pupil will be attended with success. The most successful is that by incision, owing to the uncomplicated state of disease which belongs to these cases requiring this kind of operation. The pupil is contracted or closed from iritis whilst the cornea is transparent, or it is closed from a wound or ulcer near the circumference of the cornea leaving a considerable degree of transparency. The iris is tense and yields readily to the edge of the knife, and its fibres contract, leaving a more or less ovoid opening. The operation is peculiarly favorable after extraction, when the iris has prolapsed against the edge of the corneal incision. The prospect is less favorable whenever the closure has been produced by internal inflammation in unhealthy states of constitution, inasmuch as the irritation which the eye suffers from the operation, is likely to superinduce a similar attack to that which caused the closure.

The operation of excision is most favorable in cases where the pupil itself is open and the iris free, and a tolerable portion of the cornea transparent, as the protrusion of the iris through an opening of the cornea is much more likely to take place under such a condition

* Mackenzie loco citato.

than where any degree of adhesion between the iris and the cornea has existed, or the pupil closed and its posterior margin adherent to the parts behind. The introduction of a hook or forceps to drag out the iris always enhances the danger of the operation, and is not always effectual in attaining our object.

a. Iridisection by incision.—In operating for division of the iris by incision I usually place my patient in the same position as for extraction of the cataract, the horizontal, with the patient's head reclining on a pillow. A careful and intelligent assistant should support one or both of the eyelids, in order that the surgeon may have free use of both his hands. The edge of the iris knife which is to be introduced through the sclerotica ought to be exceedingly sharp, and finely pointed, shaped according to figure 1, plate XIII.

The surgeon being seated behind the patient, with the instrument delicately, balanced between the finger and thumb, and its edge directed backwards plunges it into the sclerotica and choroid at the same point as for reclination and a short distance into the vitreous humour; the instrument, is then directed towards the centre of the iris and its point protruded through it. The point is distinctly seen as it presses behind the fibres of the iris. He then carries the handle of the instrument forwards, at the same time slightly pushing the point along the anterior chamber, sweeping over the iris, and carefully avoiding to prick the cornea. The iris is now to be divided by a double motion of the in-

strument to an extent of one third of its diameter. This will not be accomplished by merely pressing on the iris, nor by one rapid stroke of the edge of the iris scalpel, but by repeated strokes, as though we were dividing fibre after fibre, and by a drawing motion of the knife as well as pressure with the edge. If the first attempt has not divided the iris to a sufficient extent, the point of the scalpel is to be again carried forwards, and again withdrawn, until the incision is of the proper length. Before finally removing the instrument we ought to notice whether the artificial pupil expands, and if the edges of the incision do not immediately separate, the pupil may be opened up by touching its edges with the flat side of the instrument. This operation is supposed to have originated with Cheseldon, and to have been improved upon by Sir William Adams. Fig. 2, exhibits an artificial pupil by incision.

The incision of the iris by means of an opening in the cornea, which originated with Janin, has been greatly improved upon by Professor Monro of Geneva. The operation is performed in the following manner with a cornea knife, and scissors fig. 3 and 4. plate XIII. An incision is first made to the extent of one fourth of the circumference of the cornea, close to its edge, and generally towards the temple fig. 5. If the case is one in which the lens has been previously removed, this incision need not exceed one fourth; but if we contemplate the removal of a cataract through the artificial pupil, more than one fourth of the cir-

cumference of the cornea should be laid open. The instrument is to be directed through the cornea at the point intended to form the upper part of the incision, and directed across the anterior chamber. The cornea is to be ripped open to the necessary extent, the scissors are bent at an angle of about 30 deg. having one blunt and one sharp point. The instrument is introduced through the opening of the cornea, the sharp point is directed through the iris, and blunt blade carried before that membrane, as near the edge of the cornea as it is intended to extend the incision. The scissors are now to be sharply closed, and the iris will be divided. Sometimes the pupil is formed by two small cuts in the iris (fig. 5, plate XIII,) united at an acute angle. The flap thus made retracts, and leaves a small triangular or quadrilateral opening. The former, as in fig. 2, will be found sufficient where the iris is on the stretch; the latter, fig. 5, when we suspect the substance of the iris to be thickened, or adherent to the capsule. When the closure of the pupil is combined with cataract, the above incisions will lay open the capsule, and may even divide the lens, the fragments of which the operator must endeavour by gentle pressure to bring forward through the artificial pupil into the anterior chamber, whence they are to be extracted by means of the scoop if they are soft, or the hook if hard. It may sometimes be possible to extract even the capsule through the artificial pupil. If a portion of the capsule is firmly adherent to the

triangular flap of the iris, it will shrink along with this and form no obstacle to vision. Any fragments of the lens which may remain will gradually dissolve in the aqueous humour.

It is necessary for the performance of these operations that the cornea should be transparent to a considerable extent, and that the anterior chamber should be nearly of its natural dimensions. The instances in which the Surgeon has an opportunity of restoring vision by either variety of this operation, are very numerous in India. I have restored some who had been blind for 12 years from simple closure of the pupil, as the sequela of iritis.

b. *Iridisection by excision*, like that by incision, consists of two varieties, viz. the lateral and the central; the latter, however, is very seldom had recourse to.

The instruments requisite for this operation consist of a broad shouldered lancet, (which I generally prefer to the usual cornea knife) a pair of small forceps, (fig. 6) curved scissars (fig. 7,) and, though rarely, a hook, fig. 8.

The incision of the cornea never requires to exceed one third of its circumference, and seldom so much. The nasal and lower edge of the cornea is to be preferred. The next best situation is the temporal, and least of all the upper portion of the cornea. But the selection of any particular situation is often not a matter of choice but of necessity, as the pupil must be opposite the transparent part of the cornea wherever that may be. Introducing the point of the knife, or lancet, through

the edge of the cornea, and as much across the anterior chamber as the state of the parts permits, an incision, of an extent which the operator judges requisite, is effected. If this is done quickly, so as to allow the aqueous humour to issue at once from the eye, removal of the knife will generally be followed by a prolapsus of a portion of the iris. Should no spontaneous prolapsus take place, the iris may often be made to protrude by gently pressing the eye-ball on the opposite side, and at the same time dilating the external opening with the scoop. Should this measure fail it will be necessary to introduce a pair of delicately curved forceps, or a double hook, with which the edge of the iris is to be seized and cautiously drawn out. In introducing these instruments great care should be taken to avoid touching the crystalline lens and capsule, which, in cases where we have recourse to this operation, is generally transparent. The operator now holding the curved scissors in the opposite hand excises the protruded portion of iris. Particular care should be taken not to excise too large a portion, a much more serious evil than the excision of too little. Any remaining portion of protruded iris after the excision, is to be pushed back into the anterior chamber by means of a probe. The operator is now to rub the eye rapidly but gently through the medium of the upper eye-lid—and then to expose it to a tolerably bright light, so as to ascertain the form and size of the newly formed aperture. Should there be an opacity of the lens, it will be desirable, if

possible, to remove that body at the same time that we form the pupil.

The cases to which the operation is best adapted are where the pupillary edge of the iris is free, or only partially adherent, with considerable opacity of the cornea, leaving merely a transparent portion at any part of its circumference fig. 9. Plate XIII. is a tolerable representation of a successful case of excision.

After treatment.—Belladonna will be advantageously employed in these operations. Should pain supervene, opium ought to be given in small repeated doses, and, inflammation must be treated by calomel and opium, venesection, and other antiphlogistic measures.

When too large an incision has been formed, so that the eye is dazzled even by moderate light, it is necessary that the patient should shade the eyes, or wear a piece of pasteboard or light wood, concave within and convex without, blackened on both sides, and having a central aperture of the form and dimensions of the natural pupil. This will considerably assist his vision in looking at large objects; although he will scarcely be able to distinguish small ones even with the aid of this contrivance.

CHAPTER VI.

ON

AUTOPLASTIC OPERATIONS.

It is singular that the principles on which are founded some of our capital surgical operations in the present day, should have been known and practiced by the Hindoos from a very remote period, especially the operations for couching, cutting for the stone, and the method of restoring lost portions of the body. The Indian mode of performing the rhinoplastic operation has now in the majority of cases superseded the Talia-cotian method, and it is on the same principle that most of our modern improvements and modifications for the restoration of different lost parts are founded. The frequent mutilations of the body practiced by Eastern despots have rendered the occasion for these operations exceedingly common. A tribe of Koomhars or Potters who reside at Kot-Kangra in the hills north of the Suttlodge, have long been famed for their dexterity in this operation, and numbers of mutilated individuals

resort to them; but from the cases I have witnessed I had no reason to admire their performances.

A rather high degree of atmospheric temperature seems to be favorable to the success of many of these operations, indeed they should not be undertaken in very cold weather.

An interesting fact, which may be turned to much practical advantage, has been well illustrated in India,—viz. that mucous membrane not only becomes integument when everted and exposed to the atmosphere, but that it becomes *black* by the deposition of pigmentum, and that integument when *inverted* becomes mucous membrane, as is exhibited in the enormous tumors of the scrotum, where the extended prepuce becomes mucous membrane, a channel of considerable length for the passage of urine enabling us to form a covering to the penis after extirpation of these tumors. In other cases we are able to supply congenital or accidental deficiencies of the urethra, by turning the prepuce back upon itself, and engrafting a flap to the abraded edges of the opening. The integuments of the forehead are not exempt from a certain degree of extensibility, greatly lessening the deformity which otherwise would result from the quantity of skin which is sometimes taken from the part to form a new nose.

The experiment of Hunter of implanting a cock's spur on the top of that bird's head is well known. Without entering into the ancient history of the operation, or enumerating the names of the various surgeons who

have practiced or modified this art; or quoting the vulgarities of Butler, which seems to be a fashionable practice amongst those who treat on this subject, I purpose to consider the principles on which the following distinctions of this branch of surgery are based. Some very interesting cases of these various deformities have presented themselves to my observation, on which I have had occasion to operate, and although they were not novel in principle, some of them presented peculiarities which indicated various modifications in the method of procedure.

j. The *Blepharoplastic operation*, was first successfully practiced by Dieffenbach of Berlin in a case where the inferior palpebra was lost by ulceration. Various modifications of the operative procedure may be required according to the peculiarity of each individual case, but the following is the principle upon which it is conducted.

The patient being placed in the horizontal posture a V shaped incision is formed around the diseased parts, and every portion included within its lines is to be detached. An incision is now made an inch in length from the external angle of the eye, and at right angles with the axis of the body. Another incision commencing at the external extremity of the first, with which it forms a right angle, is carried down below the malar bone. In this way a quadrilateral flap is performed, which is to be drawn inwards, and applied to the mucous surface of the lower lid. The bleeding of any small

arteries may be stopped by torsion, before adjusting the flap. Having stopped the flow of blood from the lips of the wound, the operator should endeavour to reduce the exposed surface of the V incision to a lineal cicatrix by means of the interrupted suture, on the principle of the hare lip operation. With the view of giving the new eyelid all the appearance of a real one, the mucous membrane which ought to have been properly preserved, should be drawn over the superior margin of the flap, and fixed so by a few stitches of the interrupted suture upon the free border of the eyelid. The flap *thus drawn inwards, and united to the inner lip of the wound arising from excision of the diseased parts*, replaces the loss of substance from the inner angle of the eye. Union by the first intention must not be attempted on the outer side, the object being to avoid the slightest tension. The wound should be dressed, with a flat compress of linen ravellings, which is secured by means of three strips of adhesive plaster. The suture stitches may be removed at the end of the second day, and any tumefaction reduced by emollient applications. The wound at the outer angle of the eye is to be permitted to granulate.

In cases where the lids are not only destroyed, but the neighbouring integument of the face completely changed in texture from extensive ulcerations or burns, so as to render the above operation impracticable, it may be requisite to endeavour to find a substitute for the lost lids by making a long curved incision extend-

ing from the nose to the temple over the cheek, with its convexity downwards, which is to be dissected off from its attachments beneath, and raised so as to cover two thirds of the globe of the eye. This incision, which must be regulated as to distance from the orbital ridge, degree of curvature, and extent, according to the particular circumstances of each case, will necessarily leave an extensive space which on healing and cicatrizing would contract, and draw down the artificial lid, leaving the eyeball as unprotected as ever, but to obviate this, two curved incisions should be made in the fore arm, about two inches apart at their distal extremities, and meeting at an acute angle at their proximal extremities, the included portion of skin should then be raised from the arm, *but left attached by its broad base* at the distal end; this is to be adjusted to the chasm in the cheek, and secured by several fine needles and the twisted suture, and the arm carefully supported by the bandages, so as to prevent any constriction of the part. By this method the base of the flap procured from the forearm will be neither stretched or twisted. This is on the principle of the ancient Taliocotion operation for forming a new nose, and which is still practiced by Von Graafe and other German Surgeons in their attempts to restore lost noses. A similar method should be practiced, on the forehead for the restoration of the upper lid, and another portion of integument borrowed from the arm in the same manner. In these deplorable cases, the everted conjunctiva

will require to be excised by a longitudinal incision previous to forming the artificial lid.

ij. *The Indian Rhinoplastic* operation is performed in the following manner. A model should be moulded on the vestige of the lost nose to the form it is required to give the supplemental one, of a piece of paper cut to the proper shape. The proper shape having been given, and all the requisite preparations made, the model is to be spread out flat, and reversed upon the forehead. Its shape is then to be traced on the forehead. This is best effected by a pencil dipped in a solution of lunar caustic. The figure traced on the skin will exhibit the appearance of an irregular isosceles triangle reversed of the size of fig. 1 Plate XIV, having in its middle a small rounded point to form the apex of the new organ and to serve as a point d'appui to the columna, which is to be obtained hereafter from the centre of the lip. The two superior angles of the flap are to be slightly rounded off.

The *second* step of the operation consists in paring off the cicatrized edges of the old wound which should be done rather deeply, and in making a horizontal incision from nine to ten lines in length along the upper lip, in order to separate it from any internal adhesion, and that the lip may be ascertained to be perfectly free.

The *third* step in the operation consists in dissecting the flap downwards towards the root of the nose, leaving at least four lines undetached between the eye-

brows. The incision on the left side is to be prolonged downwards to the extent of four or five lines, vide fig 2, by which means the pedicle is more easily reversed and less liable to strangulation. This pedicle ought to be narrow and long, so as to admit of its remaining loose, and it should embrace the fibres of the corrugator supercillii, in order that its vascular supply may be the more abundant.

During the delay which necessarily occurs in allowing the slight hæmorrhage from these incisions to subside, the operator is to proceed to convert the triangular wound in the forehead into an elliptical one, by rounding off the two superior angles, and approximating the edge of the wound by means of a few stitches of the interrupted suture. Thus converting this large wound in the forehead into an almost linear incision somewhat retracted, and the subsequent cicatrix into a perpendicular line.

The operation is concluded by twisting the flap from right to left, and turning it down upon the the cavity which the nasal fossæ presented; the edges of the flap are fitted in, and fixed on either side by the introduction of several very small *curved* needles, with sharp points, and the twisted suture, vide fig. 2, Plate. XIV,

Nothing has been said respecting the columna to be taken from the nose and which has been recommended both by Liston and Dieffenbach. Liston recommends two perpendicular incisions to be made on either side of the mesial line of the upper lip, previously stretched

and raised for that purpose, close to the situation of the former columna about an eighth of an inch on each side of the mesial line. He considers, however, that the columna should not be made until several weeks after the formation of the nose itself. These incisions are carried down in a parallel direction to the free margin of the lip. By this means a flap is insulated, composed of skin, mucous membrane, and interposed cellular substance. The prolabium of the flap is then removed and the flap everted, and fixed to the small projecting point of the new nose by the introduction of a small curved needle and the twisted suture, vide fig. 3. The mucous lining of the everted labial flap readily assumes the color and appearance of the skin and in blacks the rete mucosum becomes dark like the rest of their skin. The wound in the upper lip is to be united precisely in the same manner as after the operation for simple hare-lip. The appearance of the lip, where the operation has been well performed, will be found to be improved, for the cicatrix being in the situation of the natural fossa is scarcely perceptible; moreover in many of these cases where the columna has been destroyed, the lip falls down, is elongated and tumefied, which deformity is completely removed by this method. Much however will depend on the future adjustment and manner in which the nostrils and bridge of the nose are supported in order to preserve the contour of the nose, the proper size and shape of the nostrils, and prevent the columna from falling in. How is this to be accomplish-

ed? Mr. Tyrrell has proposed the employment of an artificial bridge of platina plate or wire. I think the object may be better effected by a piece of elastic Bamboo slit in the centre, like a pair of forceps, so as to cause a gentle pressure on each side of the alæ and thus form a natural fossa.

This need not be instituted at once. Let the nose remain for a few days in its unshapen form, only lightly supported, until adhesion and vigor of circulation is established both in the organ itself and the columna, and then let the surgeon proceed to mould the parts in the method proposed. Two quills rolled round with linen should be introduced through the nostrils. This will more especially be requisite to obviate the tendency to granulate on the inner surface of the nose, and the sides of the columna, filling up the cavity of the nares and contracting and disfiguring their openings. The lower part of the columna should be supported by a small roll of linen and a long strip of ribband passed under it and secured behind the vertex. This can be done posterior to the plugs, and without therefore interfering with them or the lip.

Such is a brief description of the Indian method in its most improved form, applied to the restoration of a nose completely destroyed.

The after treatment should consist, of the simplest possible dressings. A few strips of black court plaster or of isinglass plaster may be applied, after the removal of the ligatures, which may be done on the

third or fourth day. The wound in the forehead is to be dressed with lint moistened with warm water, covered with oiled silk, and suffered to fill up by granulations. Abstinence and perfect repose should be enjoined. Purgatives should be exhibited with a view of producing a revulsive irritation upon the intestinal canal. On, or about the seventh or eight day, when the union of the engrafted edges has become consolidated, the connection at the forehead may be divided, a thin wedge-shaped portion taken out, and the raw surfaces united by one or two stitches of the interrupted suture, and retained by gentle compression. This will prevent any corrugation at the point where the flap has been twisted.

The *Tagliacotian* or *Italian* method of borrowing from the arm may be sometimes preferable, either on account of the difficulty of procuring an adequate supply from the forehead, or from other circumstances. I have also found it advantageous for supplying deficiencies of the cheek, or of one ala of the nostril. It is performed in the following manner.

The operator having made a model of the nose in the usual way, traces its outline on the patient's arm, which is brought up and supported in front of the nasal cavity. The summit of the model regards the shoulder and the flap is dissected up from the point to the base; the edges of the injured nose are now pared; and the flap is laid down and united by various points of suture. The flap receives nourishment from its

base, which is left adherent to the arm; the forearm is to be supported on a level with the nose for at least twelve days, until the edges of the flap are sufficiently united. At the expiration of that time the base of the flap is to be divided and pierced with two orifices to resemble the nares, which are to be fashioned after the model, these are kept open with a bit of lead or lint, and the Surgeon endeavours to give the nose the best shape possible. The method already proposed may be of advantage for this purpose, and a columna raised from the lip will considerably improve the appearance of the nose. An apparatus is fixed on the renovated organ till its form is set, which Graafe recommends to be worn during the first winter.

When the lobe of the nose has been destroyed by ulceration or accident, several rhinoplastic processes may be employed according to circumstances. The Graafian method of engrafting from the arm may be attempted; or a flap may be obtained from the forehead in the same manner as if the whole organ had been lost. When this operation is performed, Mr. Labat judiciously recommends denuding the cutaneous tissue which covers the proper bones of the nose and forming a kind of nutritive sulcus,* in order to establish a more intimate union between the skin and the inner surface of the flap. Dieffenbach of Berlin, who since Tagliacozzi or Tagliacotius is perhaps, the

* *Lancet*, vol. i. of 1834-85, p. 388.

greatest restorer of noses that has appeared, has modified this operation, and proposes to take the flap from the scalp, in order to avoid the cicatrix in the forehead; and instead of the sutures commonly used, he employs a quantity of very small needles with the twisted suture. Indeed in some cases he has gone so far as to introduce thirty-two of these in order to obtain a more complete contact.

In some cases M. Dieffenbach proposes instead of taking the flap from the head, to remove the edges of the old nose, and to bring them as close to the median line as possible, after having practiced lateral incisions to favor this approximation.

Finally, the author proposes to take two elliptical flaps, one from each cheek, to form the wings of the nose, and to supply the septum below by a flap from the upper lip. This method has been crowned with complete success in practice; the cicatrix on each cheek becomes almost lineal, while that on the lip is barely discoverable by the eye. In Plate XIV, fig. 4, *a* is the band of attachment to the cheek, close to the side of the nose, and *b* the extremity attached to the top of the nose.

When the nasal deformity comprehends only the superior or dorsal ridge of the nose, a case comparatively rare, it may consist either in a congenital or an accidental fissure of the parietes, in a congenital absence of the dorsum, or in a greater or less marked depression of the bridge of the nose.

In the first case, the operation called rhinographé is applicable ; the edges are to be pared and brought together by the twisted suture, as in the cases of harelip, and this operation generally succeeds, especially when the fissure has been occasioned by a cutting instrument as the blade of a sabre. M. Labat details several cases of this latter kind, cured by Larrey and others.

When the dorsum of the nose has been destroyed, it is a point of much practical importance for the Surgeon to consider whether or not the loss of the substance may not be repaired by simple rhinographé ; again, he should be careful to examine whether the anterior edge of the septum be sufficiently prominent or not to serve as a support to the flap. Should enough of the septum remain, its edge is to be paired, and the flap united along it ; in the contrary case, this union must be avoided, to prevent an ugly depression of the nose. With these precautions the flap is taken from the forehead, and laid down on the dorsum of the nose in the manner already described.

Complete depression, or, burying of the dorsum of the nose in the nasal fossa, is a most disgusting deformity, though less hideous than those which we have just noticed, and it is to Dieffenbach again that we owe the operative methods applicable to this accident.

It consists, says Dieffenbach, in excising the middle of the dorsum of the nose like a pyramid, by two transverse incisions, which meet at an acute angle near the skin of the cheek ; or the depressed dorsum is preserv-

ed, and an oval flap is taken away from the lateral parietes of the organ, and from its cartilaginous septum by plunging a bistoury horizontally across directly through the nose—one of the ends of this flap turns towards the dorsum of the nose, the other downwards towards the skin of the cheek. The septum, after these incisions, is united by points of simple suture, and the lateral parietes by the twisted; the effect of the new cicatrix is to throw up the dorsum of the nose which was before completely depressed. The latter method is the preferable one where the nose is a short one.

iii. Labioplasmic operations.—The best period for operating in the complicated cases is from $2\frac{1}{2}$ to 4 years. It would be alike hazardous to commence the operation for the *simple* fissure on an infant under three months old.

Previous to operating, any adhesion of the lip to the gum should be divided, and if one or more of the incisor teeth should project so as to interfere with the incision they should be extracted.

The operation for single harelip consists in slicing off freely the edges of the fissure, which should not be done sparingly, for there is no actual loss of substance in this disease. I usually prefer a sharp cornea knife for this purpose. The parts are seized by the operator's thumb and forefinger, and drawn forward, whilst with the knife in the opposite hand the part is trans-fixed from within outwards, and the edge and rounded

corner of the fissure excised. Care must be taken to remove rather more than the rounded corner of the vermillion portion of the lip otherwise an unseemly notch will remain. The same procedure is accomplished on the opposite side. The operator then directs the edge of the knife upwards above the angle of the fissure, on both sides, thus causing two clean and regular incisions to meet at an acute angle as is exhibited at fig. 5, *a a* indicating the points of transfixion.

Hæmorrhage is completely controuled by firmly pressing the lip between the fingers of an assistant. The line of these two straight incisions is now to be brought into exact apposition. For this purpose, two small curved needles, flattened at the sides, should be preferred to the ordinary straight ones. The lowest pin is to be introduced first close to the natural margin of the lip, the second about a quarter of an inch higher up. The pins ought not to extend deeper than about two thirds through the substance of the lip, and they should be made to enter about two lines and a half, from the margin of the wound, and come out at the same distance on the opposite side. This will have the effect likewise of suppressing any hæmorrhage from the labial arteries, which immediately ceases when the edges are brought in apposition. A piece of thread is then to be wound repeatedly round the ends of the pins, from one side of the division to the other, first transversely, then obliquely, from the right or left end of the pin above, to the opposite end of the

lowest one. A light compress is to be applied to each cheek to obviate all tension of the lip, which is to be secured by the four-tailed bandage, or common split cloth. The pins may generally be removed on the fourth day.

In *double* harelip if the flap be short and free, without osseous projection, the operation may be concluded at once in the manner here represented, the edges are pared on both sides, but the incision ought to include a rather larger portion of the lip, than is usually represented in diagrams of this operation. To remove less would occasion the wound below to be unequal, and thus produce a degree of deformity afterwards. The parts are brought together as in single harelip, the small intervening flap not preventing apposition below. One pin is passed through the central piece of the lip, the other traverses the flap. These principles are equally applicable to all accidental cuts or lacerations of the lip, as well as to removal of cancerous or other tumors wherever it is possible to obtain a co-aptation of the wound. I have removed spongoid tumors from the lower lip, which in such cases by repeated hæmorrhages, undermined the constitution. Although there was a considerable loss of substance, adaptation of the parts was complete by this mode of procedure, and considerable improvement in personal appearance results if the mouth is naturally large.

It not unfrequently occurs that any slight fissure in the root of the mouth gradually diminishes after the

operation; but in other instances, especially where the opening in the palatine plate of the superior maxillary bone is wide, it becomes requisite to adjust some mechanical contrivance, consisting of a plate of platina, fixed by means of a spring; but these mechanical contrivances are capable of much improvement.

In the more complicated deformities attending hare-lip, the labial tubercle is inserted very close to the nose, its union to the lateral parts draws the lip upwards and exposes the gums and teeth, while the nose itself is pulled down and flattened in a most hideous manner. Hence Dupuytren suggested, that it would be better to employ the labial tubercle in forming the lower part of the partition of the nose, and to unite at once the lateral portions of the lip. The following is the most approved method.

The fleshy tubercle is separated by the bistoury from its osseous support. This is cut with the bone-nippers. The fleshy portion, the edges of which have been refreshed, is next brought horizontally backwards, and employed altogether in forming a septum or lower part of a septum nasi. The harelip is then pared in the usual manner and united as in the case of a single fissure of the organ.

When the bone projects and the flap is long, Mr. S. Cooper has been very successful in rendering the parts favorable for operation by gentle and continued pressure, by which the osseous prominence is reduced.

It will be prudent to remove as little as possible of

the tubercle which projects beyond the maxillary bone, for the part that is left behind though but of inconsiderable extent will always be sufficient to fill up to a certain degree the median line of the palatine vault.

The inferior lip is capable of union to an equally great extent as the upper, but where the loss of substance has been too considerable to admit of a coaptation of the freshened edges of the part, it is easy to engraft a portion of integuments borrowed from the under surface of the chin.

ju. *The operation for cleft palate* is performed in the following manner.

Having arranged the necessary apparatus, consisting of a porte aiguille used for seizing and inserting the ligature needles, a long hook, several curved needles, all armed with sutures of three or four waxed threads each, a small sharp-pointed bistouric, (a cornea knife, answers the purpose admirably) and a tenaculum,—the patient is to be seated opposite the light, the mouth kept open, and the head bent slightly backwards by an assistant. Two pieces of wood or cork should be placed on each side between the molars. The operator now proceeds to form an incised wound calculated to unite by the first intention by paring the edges of the fissure. For this purpose he fixes the hook into the posterior edge of the velum pendulum palati, and plunges the point of the sharp bistourie through the middle velum, he cuts backwards towards the hook, and then turns the edge of the knife forward and cuts

to the hard part. The same is done to the opposite side of the fissure, thus converting the whole into a clean V shaped wound, particular care must be taken to let the incision extend a little above the front angle of the fissure. The patient is now permitted to rest for a few minutes, and to rinse the mouth with cold water. The second step of the operation, consists in introducing the ligatures, by far the most delicate part of the operation. The needles should be small and sharp. At two or three lines from the point of each needle, there should be a slit open at its posterior end, extending along side of the needle to its middle. In front of this eye, or slit, the needle is broader than behind, which facilitates the passage of the part of the instrument that follows. The eye having had the ligature introduced through it, the curved portion of the needle is conveyed into the mouth beyond the palatine fissure and the point carried behind the middle of the uvula, and passed through the latter part from behind forwards. As soon as the point of the needle has passed sufficiently forwards, and the ligature in the slit of the instrument is perceived, the thread is to be taken hold of with a tenaculum, and having been disengaged from the edge, or slit in the needle, the latter instrument is withdrawn. A second ligature is to be passed half an inch higher up, and a third at an equal distance from the second. Finally, the bistourie is to be plunged into the velum palati, on both sides of the suture, and an incision of a few lines effected. By this

means the tension of the parts is relieved and the edges of the wound remain in more perfect opposition. The ligature is then to be tied, and both ends cut off. Dieffenbach employs ligatures composed of thin leaden or pewter wire, by which he avoids the tedious process attending the tightening of the thread ones. The needle is attached to the wire, by means of the male screw. He merely twists the leaden ligature, and thus unites the edges of the wound. The ends of the twisted ligatures are cut off with pliers. The operator can increase the tension at any future period that it may be required by simply giving an additional twist.

No dressings are requisite, but the patient must refrain from talking, and as much as possible even from swallowing his saliva, which should be allowed to flow from the mouth. Abstinence must be enjoined for the first four days, after which, nourishment should be administered, in the fluid state.

Between the third and fourth days, one or both of the upper ligatures may be taken away, but the posterior one should not be removed until the sixth, or seventh day. Should any cleft remain after the removal of the ligatures its edges may be touched by the nitrate of silver to promote its closure.

The needles used in the above operation are the suggestion of Mr. R. N. Smith, a Surgeon of the United States.

The operation requires a considerable degree of for-

titude and steadiness on the part of the patient, and should not be attempted until the age of twelve, or fourteen. It is only applicable where the separation is not very extensive. A good criterion of the case being favorable for operation, is by causing the patient to throw the muscles into action, when if the edges are perceived to approximate by this action, the operation may be undertaken with a fair prospect of success.

v. With respect to fistulous openings in the *urethra* whether arising from congenital or accidental causes, after what has been advanced in this essay on the principles of autoplasmic operations, it only remains to be observed, that in the anterior portion of the canal a part of the prepuce may be reflected back upon itself, and a flap engrafted on the abraded edges of the fissure, and united by means of the twisted and interrupted suture. For the cure of fistulæ situated further back, the callous edges may be abraded, so as to present clean fresh surfaces, which are then to be united by several points of the twisted suture, a catheter being kept in the bladder until the process of adhesion has become complete. In more extensive fistulæ it may be necessary to dissect a flap from the perineum or scrotum according to the position of the fistula, previously *refreshed* by incisions. A catheter is to be retained in the bladder, and by this treatment the patient regains a urethra, merely requiring the use of a finger for pressure on the *canal* at the point of operation, to supply the deficient muscular power of the urethra,

after the bladder ceases to act in expelling the *very last drops*, which is an action of the urethra alone, and one which is always imperfectly formed when stricture is present.

vj. We are indebted to Dieffenbach for a very ingenious expedient for the restoration of the natural dimensions and form of the mouth when contracted either from congenital or accidental causes. It is by no means uncommon to witness deformities of this kind produced by contractions following scrofula, small-pox, severe burns, or from extensive sloughing of the mouth and adjacent parts. The orifice is in some cases so small as scarcely to admit the introduction of the point of the finger. Dieffenbach experiencing the signal failure which always attended the methods hitherto contrived for the relief of such cases, viz. incisions of the commissures and mechanical dilatation, the idea occurred to him of covering the incised edges of the commissures by a strip of mucous membrane borrowed on each side from the cheek. By this means he prevented the divided edges of the commissures from re-uniting to one another which they otherwise invariably do. Dieffenbach has been most successful in the result of this improved operation.—(see fig. 8.) An interesting case is given by Dr. Mutter of Philadelphia, which is republished in the *India Medical Journal*, vol. 3, 1838, p. 869.

CHAPTER VII.

ON

DRACUNCULUS.

Filaria Medinensis.

Various have been the opinions respecting the cause of this curious parasite invading the cellular texture of man, and especially the intermuscular cellular texture, the mode in which it enters the human body, and the class of animals to which it belongs.

The opportunities which I have had of observing the affection as it prevailed in the valley of the Dhoon, among the cultivators of that district, and amongst the grass cutters and Saees's of the Body Guard whilst the regiment was cantoned there, and the further development of the affection since the regiment's return to the Presidency may enable me to furnish some interesting corroborative facts. I shall confine my remarks to the following heads.

1st. The opinion of authors as to the nature of the soil in which the *Filaria* abounds, and where the complaint is found to be most prevalent.

2nd. The probable mode in which the animal is conveyed into the system, and the circulation, the period of the maturation of the animal from the moment of its first introduction until it threads its way through some secreting capillary pore, either into the general or the intermuscular cellular tissue.

3rd. Its growth and migratory habits, and the *symptoms* which it produces.

4th. The *class* to which the animal belongs, and its analogy to the *Filaria Equi* or worm in the eye of the horse, both in its origin and in the above phenomena.

I shall conclude with some brief observations on the most advantageous remedial measures.

1. Worms greatly resembling the filaria are found in the waters of the Dhoon, where also the disease is exceedingly prevalent. This has been confirmed by the experience of several medical officers in Bombay as will presently be quoted. Dr. Morehead, (Bombay Establishment) is of opinion that the localities in which *Dracunculus* prevails are in districts the rocks of which are of the secondary trap series, i. e. rocks reputed by geologists to be of igneous origin. This is also the opinion of Dr. Chisholm and others. This does not appear to accord with the subsequent experience of others. The valley of the Dhoon is certainly bounded on two sides of the irregular triangle which it forms, by a low range of hills of igneous origin, the other longer side of the triangle on the north is bounded by the Himalaya chain, from whence all its waters are

derived. It does not therefore appear that the secondary trap series has anything to do in causing the prevalence of the dracunculus. As McClelland justly remarks "there is nothing in which more caution is requisite than in drawing inference between geological structure and diseases, nor any thing more deserving of further serious investigation." I question whether it would lead to any practical result, in the present case, as we are sufficiently acquainted with the cause of the disease to point out an effectual prophylactic measure. The knowledge of the disease prevailing in a particular district is a cogent objection to its being selected as a residence for troops. Dr. Morehead is further confirmed in his conjecture by a reference to Dr. Scott's report of its prevalence in the Toomboodra and Mahratta country, where the secondary trap series commences which extending northwards forms the table land of the Deccan. (Vide further remarks on the subject in Dr. Morehead's Essay in the Trans. Medical and Physical Society, vol. VI.)

2. I need scarcely allude to the opinion of Dracunculus being a diseased absorbent, and termed by Dr. Mylne "Lymphatitis." Numerous medical officers have repeatedly seen the worm exhibiting every manifestation of life immediately after its extrication from the body.* The native testimony is corroborative of its

* Corbyn's India Journal of Medical and Physical Science, volume I, new series, and Trans. Medical and Physical Society of Calcutta, in which are to be found several interesting papers by Drs. Kennedy, Bird, Smyttan, Morehead and Duncan.

being a worm. Dr. Robertson (Bombay establishment) has observed a filamentous worm, in every respect like the guinea worm which whilst stationed at Bhewndy in the southern Kankan, during the rains of 1822, was brought in by a Bheestee, and identified by the natives as the "Nihroo." Dr. Smyttan has found the same animal attached to the peritoneal covering of the liver, and to that of the left kidney, which was writhing alive, and partly floating among the viscera.

The troopers of the Body Guard when quartered at Deyrah obtained their water from a mountain stream particularly reputed for purity. They were exempt from the disease. Being an able and strong body of men may be another reason why they were not affected; a low degree of vitality favoring the development of all parasites in the human body. The grass cutters and saeeses, especially the former, conformed to no regular system in this respect, but drank from all sources, being often out in the country. A more feeble race than the grass cutters of the Body Guard generally, and the cultivators of the Dhoon, can scarcely be found.

Another circumstance worthy of notice is that no case of dracunculus occurred in the Body Guard during the first year. A whole year was required for the growth and manifestation of the animal under the integuments. Drs. Kennedy, Bird, Smyttan, Morehead, Duncan, Twining and Jackson have, I believe, made the same observation as to the period required for the develop-

ment of the complaint. All the cases in the Guard occurred on the second year's cantonment at Deyrah, and during the following year on the regiment's return to Calcutta, and there are now seven grass cutters labouring under the disorder, or under the effects of the same, and there are several more in the lines.

3. It is probable that the young when once imbibed into the system, and when not larger than a minute hair, threads its way through some capillary pore or secreting orifice, and finds its exit into the cellular tissue, where it derives its nourishment, and grows, and as it migrates and increases, often excites a real diffuse phlegmonous inflammation. A formication commences under the skin accompanied with a superficial cord-like elevation on the surface. A phlysiaceous vesicle or pustule forms which bursting gives exit at a circular aperture either immediately or after suppurating for a day or two to the head of the worm. These local symptoms are preceded usually by slight derangement of the system generally. When situated about the fingers or toes, the worm is often productive of much suffering and is with difficulty got rid of. When deeply seated it sometimes causes considerable fever, great swelling, and tedious abscesses and sinuses, giving out a serous ill-conditioned discharge for months after making its appearance.

4. I now proceed to describe the worm.

The length of the *Filaria Medinensis*, *Guinea worm* or *Dracunculus* varies from six inches to two, eight, or

twelve feet, and its thickness from half to two thirds of a line. It is generally of a whitish color, but sometimes of a dark brown hue. According to Curling* the caudal extremity of the male is obtuse, and emits a single speculum, in the female it is acute, and suddenly inflected. In other kinds of *Filaria* infesting animals, a simple ovary, oviduct and uterus have been observed. The generation of the *filaria* is viviparous, and the progeny which are extremely numerous, are not included in a special generative tube, but float freely along with a granular substance, in the common muscular integuments of the body. According to Mr. Duncan, it required dilution to permit them to be distinctly seen; they were very lively, the 57th part of an inch in length, somewhat in shape like the tadpole of a mosquito, but very much smaller; fully a third consists of a fine extremity like a sting; they swim after the head, but can fix their slender extremity to an opaque substance, and work the body to it. They have two dark lines running along the length of the body. Convinced that I could not place the specimens in better hands, I made them over to my friend Mr. McClelland, the result has been the annexed interesting microscopic drawings plate XV. It is gratifying likewise to be able to confirm what had been advanced from so intelligent a writer as Mr. Duncan of Bombay regarding the young ones,† with

* Curling's Lectures on the Entozoa and internal parasites infesting the human body.—London Medical Gazette.

† The reader will derive much information in the able paper of Mr. Duncan in the 2nd part of the 7th vol. Calcutta Med. Trans.

this view I requested Mr. McClelland to cut across the body of a dracunculus which presented from the leg of a patient in the Body Guard Hospital, whilst with a stanhope lens I examined the bluish white fluid which escaped. By so doing I immediately perceived the young writhing about in the fluid. The mere stain of this fluid which adhered to the lens exhibited when held up to the light from thirty to forty of the young, (plate XV, fig. 4) and the number of young contained in a single drop were innumerable. Mr. McClelland then took the worm and the fluid to his house for further examination. I there had an opportunity of observing other interesting facts which he has since published.*

“Near the caudal extremity there are certain irregular openings, probably connected with the generative functions, or with the state of development of the young, particularly as these apertures are not observed in all specimens; figs. 1, 3, are possessed of them, and fig. 2, is without them. It is right however, to say, that they may have been occasioned by violence in the two first mentioned specimens, otherwise we should be inclined to refer the circumstance of the caudal extremity always presenting to the surface, where it occasions an irritation, and eventually protrudes, to a natural function connected with the distribution of the young.

It does not appear that these animals multiply in

* McClelland's Journal of Natural History. Oct. 1840.

the body to such extent as the vast number of young which they contain would lead us to suppose them capable. Indeed, considering the pain and irritation which a single individual is capable of producing, we cannot suppose that the powers of human life could long survive many of them. What then becomes of the millions of young which a single adult is capable of producing? To let them loose in the unfortunate body which the parent parasite itself inhabits, would be contrary to the ordinary economy we observe in Nature for the preservation and distribution of the young; such a multitudinous brood would rapidly destroy the animal on whose life their own would depend. We are therefore rather inclined to the belief, that when the parent worm is prepared to dismiss the young brood, it irritates the skin by means of the sharp point of the tail, and thus causes a pustule through which the point of the tail passes, and the young are allowed to escape externally with the discharge.

“ Our observations on the young themselves may afford a clue to their future progress, and to the *cause* of the disease. A drop of the milky substance in which they were contained having been submitted to the microscope, the young were seen in full enjoyment of life and energy. Two or three drops of water were then added, when a few of the young which extricated themselves from the mucus, and entered the water soon died, the others continued to evince signs of life as long as the proper secretion in which they were enveloped re-

mained sufficiently soft to admit of their motions being perceptible, which was for two hours after they had been taken from the parent. They were then left on a glass under the microscope, and 24 hours after, the mucus being perfectly dry on the glass, they were then moistened with tepid water, when several of the young were again seen to be in motion, the caudal extremity quivering and flowing freely about, the body writhing, but still remaining fixed by the head to the hardened mucus. They were then rolled up in cloth and exposed to the steam of hot water, with a view of setting the heads free, but this temperature being too great for them they were destroyed, thus depriving us of the means of making further experiments as to the length of time the young are capable of remaining torpid, and the circumstances most favourable to their resuscitation."

Fig. 1, Plate XV. The magnified drawing represents the extremity that first presented itself, and which is probably the tail; the two pointed bodies situated at its termination, are not of course perceptible to the naked eye. The other extremity of the specimen was imperfect, having been broken off. Fig 1 a. natural size of the specimen.

Fig. 2, another specimen, in which instead of pointed speculæ the extremity is convoluted and smooth. The other extremity of the specimen is imperfect, having been broken off. 2 a. natural size.

Fig. 3, represents the head and tail, of the only

perfect specimen I have seen. The tail, 3 a. is pointed and recurved as usually observed ; 3 c. is the mouth the head being bent in the specimen as here represented, and the mouth directed upwards and radiated."

Fig. 4 exhibits the young as they appeared in the field of the Stanhope lens when held up to the light.

The reasons for presuming the similarity of cause, between the *Filaria Equi* and *Filaria Medinensis* in question are the following.

They appear to be acknowledged, but different genera of Zoophytes, viz. the Entozoa. The *strongylus armatus* and *filaria papillosa* frequently observed in the eye of the horse exist likewise in the cellular tissue of that quadruped, and they have been frequently discovered in the cellular tissue around the lumbar vertebræ associated with weakness of the loins. They have been discovered by Sir Astley Cooper, Sir Everard Home and other anatomists in the circulating blood. The arteries of the ciliary processes of the horse are very large, and it is highly probable, as Sir E. Home remarked, that the *strongylus armatus* and *filaria papillosa* found alive in the aqueous humor of that animal in India, get through these arterial branches, more especially as they are known to exist in the circulating blood of that animal.* The *Filaria Equi* is also according to Dr. Hardtman and Captain Wyatt found in the cellular

* I may refer to the paper of the late Mr. Twining on the subject of the filaria in the eye of the horse, also that of Mr. Breton.—Trans. M. and P. S. vol. i.

tissue behind the peritoncum, and the *Filaria Medinensis* or *dracunculus* has likewise been found in the peritoneal surface of the liver and spleen, as previously quoted from Dr. Smyttan. *Filariæ* have even been found in the eye of the human subject by Dr. Nordmann of Odessa, and by Dr. Treutler in the bronchial tubes. —(*See London Medical Gazette.*)

There is a very intelligent paper by Mr. Hughes, Veterinary Surgeon, formerly attached to the Body Guard, stating that the *filaria equi* is more prevalent in *marshy* situations, and where horses are watered from Ponds, Tanks, and Lakes, whereas those watered from deep wells, and in dry situations are less frequently affected with it. Mr. Hughes further states that the *filaria* cannot enter the eye from without, but by the stomach as the appearance of the worm and the inflammation of the eye are simultaneous; whereas on the other supposition, it is reasonable to conceive that some inflammation would be excited at first. I have examined the *filaria equi* with magnifiers of 100 diameters, and discover no difference in the general appearance and direction of the fibres of this worm and *dracunculus*, but the parasites of animals are as various as animals themselves, and therefore it is impossible to say more than that it appears that these thread-like parasites get into the system of man and other animals in a similar way. How could any such animal however so minute penetrate the dense sclerotica or cornea? How can they enter by the skin as some authors have sup-

posed? for however minute it seems quite impossible to conceive that they could find their way against the capillary current and mount up some branch against the force of gravitation and the velocity of the blood, or pass into one of the vasa vasorum to a trunk, and thus by such circuitous route at length arrive at one of the ciliary arteries and drop into the aqueous humor at some capillary opening of the iris or in the ciliary body. The *reductio ad absurdum* may be applied to such an imaginary supposition.

The opinions likewise of several medical men that the dracunculus or guinea worm is of the class of animals termed the "*Gordius*" would appear to be incorrect. The gordius is a very different animal, and is placed, as McClelland states, by Cuvier in a much higher class of animals—viz. the Annelides, in which a nervous system has been found as well as red blood, and they have never been found to be parasitical. They merely have some general semblance to the *Filaria Medinensis* when casually examined.

McClelland thinks with some writers that the animal always presents by the tail, the head being seldom seen, unless where the creature is extracted entire. "Of six specimens examined, one only is possessed of the head; all six have the caudal extremity perfect, with the exception of certain injuries to which they were exposed in the act of extraction. The tail is attenuated to a very fine sharp point, and bent like the point of a cobbler's awl. It is also generally armed

with a few rough points, probably for the purpose of forcing its way through the cellular tissue."

McClelland suspects the creature to be Hermaphrodite.

It remains only to offer a few remarks on the treatment of this often very tedious and painful disorder, and the mode of extricating the worm from beneath the integuments.

When the animal can be distinctly felt coiled under the skin, an incision may be made by the side of it and a portion of the worm seized and gently pulled forth. The natives are exceedingly careful not to wound it and attribute the severe suppurative inflammation to any broken portion of the worm remaining. Mr. Duncan to the extrication of the young of the animal. I conceive this to be the correct opinion, and that suppuration destroys them. Certain it is that very severe abscesses form after the breaking off of a portion of the worm, indeed the natives generally come to us when the mischief has occurred from their carelessness in taking out the worm at their own homes. A free incision having been made over the worm, it is to be seized and gently brought forth by means of a bent probe. Should the animal's head have presented through the phlysiaceous pustule it may be carefully pulled forth and turned round a small rolled piece of adhesive plaster. I have succeeded in this manner in rolling off three feet of the worm in the course of an hour. This may be favored by gentle pressure on the

skin over the worm, and by pouring a stream of cold water over the part. We cannot always accomplish the extraction of the whole of the worm in this manner, for how is it possible to draw forth a worm running for a considerable depth among the muscles ?

For the abscesses, I have always been able to afford great relief by a deep and crucial incision, treating the ulcer on the general principles applicable to the character of the sore.

Dr. Morehead recommends the practice of Mr. Wilkins of cutting down parallel to the worm, and on exposing it, to pass a thread underneath by means of an eye probe. "Where the part was fleshy, and also in many cases about the ankle, the extraction was speedily effected, sometimes in less than an hour and the patient was cured." I have witnessed an instance of three worms pervading different parts of the lower extremity of the same individual.

NOTES.

(Note to page 412.)

Concerning certain interesting Phenomena manifested in individuals born blind, and in those having little or no recollection of that sense, on their being restored to sight at various periods of life.

When the profound and discerning Mr. LOCKE in his Essay on the Human Understanding asserted that ideas were not innate, he meant, no doubt, that so far as the mind's intercourse, in its present condition, with all objects submitted to it was concerned, its noble faculties were destined to be educated only by legitimate objects of excitation through the medium of the senses appointed for that purpose. His eccentric comparisons of the mind to a dark room, a blank sheet of paper, &c., meant in reality nothing further.

It occasionally happens that in the course of very extensive practice we have opportunities of illustrating this, in cases of restoration to sight of persons born blind, and also in cases of individuals who have known and distinguished colors; and "then (as Mr. LOCKE expresses it) cataracts shut the windows," and if restored to sight many years afterwards, they are in precisely the same situation as though they had never seen before, having not the slightest recollection or idea of colors any more than the individuals born blind. All is to be acquired "*de novo*."

I will particularize the following from amongst several which have occurred to me.

No. 1.—The following is illustrative of the fact of all ideas of objects and colors having to be acquired, as well as a verification of the problem contained in the 8th Section of the 2d Book of Mr. LOCKE in his chapter on Perception. "Suppose a man born blind, and now adult, and taught by the touch to distinguish between a cube and a sphere of the same metal, and suppose the cube and the sphere placed on a table, and the blind man be made to see; (quære: whether by his sight before he touched them he could now distinguish and tell which is the globe and which the cube?) to which the acute and judicious proposer answered—No."

A pandit, 18 years of age, native of Saugor, was born blind; his mother states that she had kept him in a dark room until the 10th day after her confinement, when on taking him to the door and exposing his eyes to the light, she discovered the pearly appearance of the pupils peculiar to cataract; and she affirms that he has always been blind. He is intelligent and cheerful, and has been in the habit of finding his way about Saugor and the adjoining country for many years, frequently singing, of which he is very fond. He had little or no inclination to undergo the operation,—at least not sufficient to overcome the fear which he entertained. He could perceive the light, and had acquired the habit of rotating the head constantly in progression in a regular and curious manner to the right and left, with a view, I imagine, of admitting the light to the retina obliquely between the circumference of the cataract and the inner edge of the iris. It was a long time before his relations could persuade him to submit to an operation. He had requested to be taken to me some months previous; was gratified at being told that he might be made to see like other people; but the slight inconvenience attending the introduction of a few drops of the solution of *bella donna* into the lids, and my holding the lids to try how they should be supported, annoyed him—and he said he would much sooner go home and eat his dinner. “What do I want with being restored to sight?” His mother likewise expressed her disbelief as to a person born blind being made to see. The principal pandit of the *muhallah* at length overruled the objections. The operation was performed on the 28th of August. He complained of but little pain, and indeed there was scarcely any inflammation produced by the operation. He immediately became conscious of a considerable increase of light.

The eye-balls, as in all cases of congenital cataract, moved about without any control, which, together with a very prominent brow and much spasmodic action of the lids, offered some obstacles. So little irritation had occurred, that I operated on the 30th August on the left eye, which resembled the former operation in every particular. No inflammation followed, but the right eye had become inflamed, in consequence of which his eyes remained bandaged for several days, and it became necessary to bleed him. He expressed himself as sensible of a remarkable change having taken place: the light was most distressing to him, and continued so for some time. On the eighth day the absorption had proceeded very satisfactorily: several substances of various colors were presented to him. He could not recognize any of them, until he had made himself acquainted with them by the sense of touch. He brought them very close to his eyes, moving his head in his accustomed peculiar manner. Whatever he attempted to reach, he always missed his aim. He expressed himself as highly gratified, and confident that he would see and know every

thing, but did not like too much interrogation. On the 12th day he came to me again. The eye-halls were no longer rolled in their former vacant manner. He had acquired the power of directing the left eye, which had been most instructed, on objects; the right eye, from inflammation, having remained bandaged. A lady shewed him her shawl: he said it was red, which was correct; but did not know what it was, until examined by the hand. The platform in front of the house was recognized as green, and his mother said he had been examining many things at home. The absorption of the cataract had proceeded, leaving two-thirds of the pupil of the left eye quite clear; some inflammation still in the right. He said he was no longer afraid of me, and that he would submit to any thing I recommended. On the 16th of September he walked from the town to see me, accompanied by his mother. He had gained much information during his absence. The pupil of the left eye had become almost entirely clear. He said he had seen a great number of trees on the road, the lake, and a huggy passing by. He had made himself acquainted with several things. What is this?—A lota. This?—A pawn leaf. Which answers were correct. A small hooka was shewn him: he touched it, and was told what it was; several things were then presented to him and the hooka was again brought. He observed, "I cannot tell; you have submitted so many things to me, that I am confused, and forget their names." He felt it and then exclaimed, it is the same hooka. Presently it was shewn him a third time; he recognized it after having carefully viewed it from top to bottom without touching. He observed a hook, remarking that it was red; but he knew not that it was a hook until told so. It was presented to him a few minutes afterwards, and he recognized both the color and the hook. He said he was extremely happy and gratified with all he saw. He followed me with his eyes as I moved about the room, and pointed out the different positions I took. He recognized distinctly the features of his mother's face. She hid it under her chadder; he laughed, and observed that she had done so, and turned his face away. He said, "I can see every thing; all I want more, is time to learn what they all are; and when I can walk about the town, I shall be quite satisfied." He could not ascertain whether any thing was round or square, smooth or rough. He distinguished the following: some partridges, the cage and the cup containing the water. The color of their plumage he correctly stated; also the windows, the fields, the sky, a child in arms, &c. On the 7th he again came to see me. He pointed out every feature in his mother's face, her hair, the color of her dress, the different distances and positions which she purposely took, and when changing places with another woman, selected her out. He stated that if I would bring the red book I shewed him yesterday, he would recognize it. I accordingly brought him a red morocco book, but smaller; he said it was the hook! At this period his knowledge of

the shapes of bodies and their sizes was very imperfect, especially the latter. He directed his hand straight to whatever things were now presented before him. The last time I saw him, a small ivory looking-glass, a paper-cutter, and a cut jelly-glass, were placed on the ground; they were shifted and changed, and he distinguished each respectively. He was much amused and laughed heartily. I gave him the looking-glass, in which he noticed his face, and said it was like other people's, *achchha*.

It will appear, therefore, that his judgment of distance, colors, motions, and positions, was very considerable. That of size and form was to be acquired more tardily.

At this period I quitted Saugor, and have heard nothing further of him.

No. 2.—The next is a similar instance of an individual who had never seen before,—a Brahman boy of 10 years of age, residing at the *Kherie Pass*, near the *Dehra* valley.

A few days after the first operation when the bandages were removed, the principal circumstance worthy of note was the confusion and embarrassment of the mind, arising from new and unaccustomed impressions and the dazzling influence of light.

On the seventh day he had acquired some voluntary power over the ball of the eye, being able to steady it somewhat, and fix it on any object he wished to discern, but only for a few moments. He had after repeated practice acquired a knowledge of most colors, but it was not until the twenty-sixth day from the first operation that he could be said to have a tolerable acquaintance with the visible world. During this period, when the absence of pain and inflammation permitted, (for it was necessary for him to undergo several operations,) the bandages were removed before and after sunset, and his attention was directed to men sometimes standing, sometimes moving; also to the tent, sky, trees and their foliage, animals of different kinds, the colors and figures and motions of which he was able in time to discern.

There was no correspondence, however, for a long while between the sight and touch, neither did he for several days direct his eyes straight to objects so as to examine them minutely. At night he would contemplate the stars, and the flame of a candle, and the features of my face, &c. Debility, the necessary result of the treatment, &c. in a delicate frame, was one cause of the slowness of progress. As he gained strength by an improved diet, his vision greatly improved.

He was observed to take up various objects and notice them; latterly I was in the habit of calling him into my tent when at breakfast. He noticed the cups and saucers and their patterns; chintz on the canvas; and he observed attentively a hooka, describing the bell (cut glass) as bright; noticed the snake, and mouth-piece (silver), and saw distinctly the smoke ascending.

On the 20th of December he walked several yards without assistance. A lady gave him a colored cbintz cap, with which he was much pleased, and he distinguished on it the colors of green and red, and the white ground. As his new sense could scarcely be said to have been fairly exercised more than fourteen days, further observations could not be made as to his judgment of distances, positions, forms, and motions.

No. 3.—A similar result, as far as phenomena, occurred in a boy of 12 years of age, though his acquirements were more rapid, from his natural mental intelligence being superior to the former individuals the cause of his blindness was disease after birth from the small-pox. The nature of the operation being the formation of an *artificial pupil* opposite the outer transparent portion of the cornea, it is unnecessary to repeat the details which are so similar to the preceding, and though he had seen for some weeks of his early existence, of course he had to acquire all '*de novo*.'

No. 4.—There are others who have been restored to sight who had lost it at a more advanced period of life—say five or six years of age and upwards, and when restored exhibit peculiar phenomena more or less interesting in proportion to the degree of remembrance they may possess of their former vision. This was particularly remarkable in a young man of 25 years of age, the brother of the boy mentioned in case No. 2, who had become blind when only 5 years old; and which is remarkably interesting in a physiological point of view, as shewing the power of the retina to preserve its susceptibility to light for *twenty* years, though not the only case recorded. There was certainly in this case a great approximation to the phenomena manifested in congenital blindness, but there was not that marked ignorance in recognising objects at first sight, nor that palpable want of correspondence between the touch and sight, but both existed to some extent. It was also curious that he should become blind after five years of the same disease with which his brother was born blind.

I recollect restoring a man, at *Cawnpore* aged 35 years, who had been blind for a period of twelve years from the Syphilitic Iritis, causing closure of the pupils. This man, after an operation for artificial pupil, recognised, of course, every thing perfectly the moment he was permitted to look about him. The interesting case described by Cheseldon, and also that by Wardrop and others, are well known, but the above brief account of *several* occurring in Indian practice may nevertheless be not uninteresting to the profession.

F. H. BARR.

On the Advantages and Disadvantages of operating for Cataract when only one eye is Affected.

This subject being much disputed by some of the most eminent Surgeons, it may not be amiss to place the objections against operation, and the arguments in favor of it in immediate succession. Premising, however, that after the subject has been well weighed on both sides, the patient's own wishes must be a paramount consideration, and nothing attempted unless it is expressly requested.

Objections. 1st.—One eye being sufficient for the purposes of life, why therefore subject the patient to the pain and inconveniences attending the operation?

anticipate the disease in the second eye, by endeavouring to restore the sight in the eye first attacked.—2nd.—Many people have a strong as well as a weak eye, and the former more frequently becomes diseased.—3d.—Obscurity from sympathy and habit, often results from a patient becoming blind of one eye; especially when first accidentally discovered by him on his closing the sound eye.—4th.—The sphere of vision with one eye is considerably less than with two.

Objection, 2nd.—Great inconvenience has occasionally resulted from confusion of vision, occasioned by the different refracting power of the two eyes, one possessing and the other not possessing the crystalline humour.

objection would equally apply to this.—3rd—Again, the extreme anxiety of the patient in the anticipation of the disease ensuing in the other is a strong inducement for operating.—4th.—The length of time likewise for the patient to wait until he becomes blind in both eyes, seems a needless delay, and painful state of suspense, seeing the period may vary from a few months to many years.—5th.—*The diseased eye, favourable for operation, may become unfavourable*, first by accident, secondly, by inflammation of an acute or chronic character, adhesion to the Iris, &c. *Amaurosis also sometimes follows from delay*, and change in the consistence and volume of the lens produces sometimes internal inflammation, and also absorption of the vitreous humour which an early operation might have prevented.

Objection. 3rd.—An eye which has undergone an operation with every success, never obtains that perfection of

Arguments in favor of Operating—

1st. When one eye is diseased, blindness must almost necessarily follow by the formation of cataract in the other eye. Ergo, it becomes necessary to an-

ticipate the disease in the second eye, by endeavouring to restore the sight in the eye first attacked.—2nd.—Many people have a strong as well as a weak eye, and the former more frequently becomes diseased.—3d.—Obscurity from sympathy and habit, often results from a patient becoming blind of one eye; especially when first accidentally discovered by him on his closing the sound eye.—4th.—The sphere of vision with one eye is considerably less than with two.

Arguments in favor of Operating—

1st.—Confusion of vision is not always or even generally the result of the operation.—2nd.—Supposing that confusion of vision generally did occur, the arguments in answer to the 1st

objection would equally apply to this.—3rd—Again, the extreme anxiety of the patient in the anticipation of the disease ensuing in the other is a strong inducement for operating.—4th.—The length of time likewise for the patient to wait until he becomes blind in both eyes, seems a needless delay, and painful state of suspense, seeing the period may vary from a few months to many years.—5th.—*The diseased eye, favourable for operation, may become unfavourable*, first by accident, secondly, by inflammation of an acute or chronic character, adhesion to the Iris, &c. *Amaurosis also sometimes follows from delay*, and change in the consistence and volume of the lens produces sometimes internal inflammation, and also absorption of the vitreous humour which an early operation might have prevented.

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Arguments in favor of Operating.

—Such imperfection is remedied by the employment of good glasses; and

vision which is possessed by a perfectly sound eye. the question is not as to the patient being short-sighted, but as to his having any vision at all, seeing that the sound eye becomes generally blind. Moreover, the advantage of vision even with a glass, is preferable to blindness without, in that eye, in every respect.

Objection. 4th.—When only ~~only~~ one eye is affected, the operation has not such a brilliant effect, and the patient is seldom satisfied. *Arguments in favor of Operating—* Such a consideration is not of sufficient weight against the proceeding arguments.

A few additional arguments in favor of operating may be adduced, but these are not of universal application, viz. 1st. The patient may have originally laboured under short sightedness (Myopia). Some of these patients see better after the operation than they did before, or than with the other eye.

2nd. Patients of an advanced period of life, who become affected with presbyopia, becoming affected with cataract, often see extremely well after the operation with the use of glasses: *vide cases annexed.*

3rd. Beer and others are of opinion that from the great sympathy between the two eyes, the morbid action of the sound eye may be prevented by the removal of the complaint in the diseased eye. But satisfactory cases in illustration have not been adduced. It is contrary I should say, to general experience.

4th. The patient being young, a soldier, &c. are among the minor inducements for operating.

OBSERVATIONS.

The right eye is generally the strongest, and the left the weakest, as may be demonstrated by looking at two objects, at different distances, in the same straight line, with both eyes open, say the flame of a candle and the finger. On closing one eye, say the right, the finger will appear to move away from the straight line, and on again opening the right, and closing the opposite eye, the finger will not appear to move. The *strongest* eye seems generally to be the first attacked with cataract.

Of a hundred cases taken in regular succession eighty eight were double cataracts and twelve single; but of course many of these latter were of recent formation and the disease will probably follow in the other eye, in most of them. Of the above one hundred, seventeen had undergone the native operation in one eye, but the disease had not been prevented advancing in the other eye, in a single instance.*

* The native operation, I have no hesitation in declaring, is most barbarous. In these seventeen cases, fourteen were completely destroyed, and in two of the others vision very imperfect. In their best cases the lateral hyaloid membrane

I have seen instances where confusion of vision was occasioned to the sound eye, especially, on discovering the blindness of the other eye. Patients may often be observed to put up their hand to the diseased eye, to shut out what little sensibility to light remains, when they wish to notice objects attentively.

Mr. Guthrie states that he has met with several instances of confusion of vision, and in *one* instance the patient wished him to destroy the sight gained by the operation. Dr. Andrew Smith, however, on the other hand, gives *several* cases in illustration of the double vision not existing at all, or being only of very temporary duration. Indeed but very few illustrative cases and facts seem to have been adduced by the *opponents*, whilst the *advocates* are rather replete with them.

In my own experience, I have never seen confused or double vision excepting on one occasion, and this did not continue, vide case of Kumber Ali Beg.

With reference to the propriety of operating on one eye to anticipate the disease in the other eye, the following case may be adduced.

Case.—R. Anderson, Esq. *Æt.* 64, resident in India, 30 years, became affected with cataract. The disease was complete in the left, incipient in the right. I restored him to sight in the left eye some years ago, after which he became blind in the right, for which he has since undergone the operation.

Case.—W. Burt, *Æt.* 50, thirty years residing in India, in the King of Oude's service, was operated on by the late Dr. Luxmore some years ago in the right, became shortly blind in the left—I operated on him successfully, both these patients saw remarkably well with glasses, and were evident gainers, by having at no period been deprived of the blessing of sight.

The following is the result of the twelve cases of single cataract previously alluded to.

Doorjun brahmin, *Æt.* 60, blind of the left eye only. The operation of reclination was performed. This patient had no confusion of vision, and saw equally well with this eye as with the other.

Case 2nd—Taj Khan, *Æt.* 60, cataract of right eye only. This patient on recovering from the operation had no confusion of vision, and saw near objects better than with the other eye.

Case 3rd—Meea Moohummud Ghos, *Æt.* 55, cataract of the left eye only,

is broken down, and absorption of the vitreous humour likewise takes place, and to either or both of these injuries may be attributed the tremulous Iris (*Synchysis Oculi*) so commonly observed. Closed pupils, Amaurosis, and general suppurative inflammation of the eye &c. often follow the native operation; independent of the many cases unfavorable for operation which are couched by some Oculists from incorrect diagnosis.

had no confusion of vision after the operation, and saw near objects better than with the other eye.

Case 4th—Hussein Shah, Syed, *Æt.* 60, cataract of the left eye only. Had no confusion of vision, and saw better than with the other eye.

Case 5th—Kurrim Ali Khan, *Æt.* 60, cataract of the left eye only. Had no confusion of vision, and sees better with the eye that has undergone the operation than with the other.

Case 6th—Kumber Ali Beg, cataract of the left eye only. Had double vision for three days, after which it subsided. Vision equally good as with the other.

Case 7th—Gunga Chumar, *Æt.* 40, soft cataract of the right eye. Prognosis very unfavourable. Three operations were required on this patient, notwithstanding which he saw extremely well and had no confusion of vision. The others had very fair average vision without confusion, and two were unsuccessful.

In conclusion it appears to me, that excepting in old and infirm people the practice of operating is founded on rational principles.

F. H. B.

STATISTICAL RECORD OF THE LATERAL OPERATION OF
LITHOTOMY IN INDIA BY F. H. BRETT.

Number.	Date of operation.	Name and Caste.	Age.		Duration of Disease.		Result & remarks.
			Y.	M.	Y.	M.	
1	Oct. 1827	A Moosulman Child,....	8	—	3	—	Successful.
2	Oct. 1828	Makhun Brahmin Child,	4	—	2	—	Ditto.
3	Mar. 1829	Kissoonaee Hindoo,.. ..	35	—	30	—	Died a month after the operation, constitution having been much impaired from 30 years of acute suffering.
4	April 1829	Hindoo, (Brahmin,).. ..	17	—	10	—	Tetanus, which on the 11th day proved fatal.
5	21 April 1829	Hindoo Child,.....	3	6	1	—	Tetanus, which proved fatal on the 2nd day.
6	Oct. 1829	A Hindoo Child,.....	7	—	2	—	Successful.
7	17 Feb. 1830	D'hunnea Hindoo,.....	5	—	2	—	Ditto.
8	21 April 1831	Peetum Hindoo,.....	6	—	5	—	Ditto.
9	3 Nov. 1831	Khoondun Hindoo,.. ..	7	—	1	—	Ditto.
10	22 Nov. 1831	Jijsooa Moosulman,.. ..	6	—	2	—	Ditto.
11	9 Dec. 1831	Bhuyjooa Hindoo,.. ..	8	—	5	—	Ditto.
12	21 Dec. 1831	Zoorra Hindoo,.....	25	—	8	—	Ditto.
13	28 Jan. 1832	Gholamie Moosulman,..	4	—	1	—	Ditto.
14	28 Jan. 1832	Munsa Brahmin,.. ..	3	9	2	—	Died of peritonitis on the 2nd day.
15	14 April 1832	Motic Chuogun Brahmin,	60	—	11	—	Successful.
16	16 May 1832	Newla Hindoo,	12	—	4	—	Ditto.
17	2 July 1832	Bhimma Hindoo,.....	18	—	6	—	Ditto.
18	11 July 1832	Ruhmaun Brahmin,.. ..	30	—	1	—	Ditto.
19	11 Aug. 1832	Nunda Hindoo,.....	7	6	6	—	Ditto.
20	13 Aug. 1832	Juwahir Rajpoot,.....	14	—	7	—	Ditto.
21	13 Aug. 1832	Lullaee Hindoo,.....	23	—	10	—	Ditto.
22	23 Aug. 1832	Chooreyá Hindoo,.. ..	9	—	4	—	Ditto.
23	Sept. 1832	Poosa Têlie,.....	60	—	8	—	He died of hæmorrhage from irregular distribution of the internal pudic artery, which was very profuse.
24	Sept. 1832	Rumzan Dhanook,.....	26	—	5	—	Successful.
25	Oct. 1832	Kurreea Gurreelea,.....	60	—	—	—	Ditto.
26	6 Nov. 1832	Nulloo Munneeyar,....	26	—	—	—	Ditto.
27	6 Nov. 1832	Sewgholam Brahmin,.. ..	16	—	—	—	Ditto.
28	7 Nov. 1832	Gungapershaud Brahmin, .	7	—	—	—	Ditto.
29	8 Nov. 1832	Alim Khan Pathan,.....	60	—	—	—	Ditto.
30	9 Nov. 1832	Guyan Rajpoot,.. ..	5	—	—	—	Ditto.
31	4 Dec. 1832	Séwa Dhanook,.. ..	60	—	—	—	Died of peritonitis on the 3rd day.

Number.	Dato	Names and Caste.	Age.	Duration of Disease.	Result & remarks.
32	7 Dec. 1832	Duela Burhaee,....	26 —	—	Successful.
33	8 Dec. 1832	Sobha Kissan,....	5 —	—	Ditto.
34	10 Dec. 1832	Dhunna Moosulman,	15 —	—	Ditto.
35	26 Dec. 1832	Bheekarrie Chumar,.....	6 —	—	Ditto.
36	Dec. 1832	Hindoo Rajpoot,.....	4 —	—	Ditto.
37	Mar. 1834	Chidda Baghban,..	6 —	2 —	Ditto.
38	Mar. 1834	Réamdal Jat'h,.....	17 —	5 —	Died of peritonitis on the 4th day.
39	26 Mar. 1834	Séwa Abeer,..	9 yrs.	4	Successful.
40	1 Apr. .. 34	Tulphie Lodhie.....	60 —	5	Ditto.
41	11 Apr. .. 34	Cbeda Baghban.....	11 —	3	Ditto.
42	25 May .. 34	Kulloo Hindoo.....	5 —	3	Ditto.
43	26 May .. 34	Desraj Rajpoot.....	19 —	7	Ditto.
44	Aug .. 34	Choonchoo Ditto.....	30 —	3	Ditto.
45	21 Nov. .. 34	Sooklal Ditto.....	7 —	2	Ditto.
46	16 Nov. .. 34	Heera Bunneea..	8 —	3	Ditto.
47	16 Nov. .. 34	Elaee Bukhs Moosulman.	8 —	7	Ditto.
48	16 Nov. .. 34	Goolooa Mehter..	0 —	0	Ditto.
49	16 Nov. .. 34	Jhind to Durgie..	7 —	1½	Ditto.
50	9 Dec. .. 34	A Chummarr.....	28 —	10	Ditto.
51	10 Dec. .. 34	A Moosulman Boy.....	11 —	1	Ditto.
52	10 Dec. .. 34	A Ditto. Fukeer.....	60 —	12	Ditto.
53	18 Dec. .. 34	Soorjant son of Emam Bux	7 —	3	Ditto.
54	31 Dec. .. 34	Ramjee Brahmun..	12 —	5	Ditto.
55	5 Jan. .. 35	A Hindoo..	10 —	3	Ditto.
56	21 Jan. .. 35	Rumzuan Ali Shaikh....	53 —	8	Ditto.
57	21 Jan. .. 35	Khoondooa Chumarr..	9 —	3	Ditto.
58	24 Jan. .. 35	R m Ruttun Brahmun..	9 —	5	Ditto.
59	3 Feb. .. 35	Séwa Aheer.....	60 —	5	Ditto.
60	4 Feb. .. 35	Guorie Sbunkur Brabmun	8 —	4	Ditto.
61	8 Feb. .. 35	A Bhesties child Moosulm.	7 —	4	Ditto.
62	28 Feb. .. 35	Heera Loll Bunneea....	10 —	3	Ditto.
63	28 Feb. .. 35	Mungoo Moosulman..	5 —	2½	Ditto.
64	5 Nov. .. 35	Oomraoo Brahmun.....	7½ —	5	Ditto.
65	7 Nov. .. 35	A Brahmun little Girl..	7 —	6	Ditto.
66	7 Nov. .. 35	Bhugwan Aheer..	14 —	13	Ditto.
67	8 Nov. .. 35	A Moosulman child..	12 —	3	Ditto.
68	Dec. .. 35	A Brahmun child..	8 —	4	Ditto.
69	Feb. : 36	James Diggs European..	4 —	2	Ditto.
70	1 Feb. .. 36	A Mehter's child.....	10 —	4	Ditto.
71	Mar. .. 36	A Brabmun child at the } Nuwab of Bandah's.. }	7 —	4	Ditto.
72	23 Apr. .. 36	A Chummar's child.....	9 —	4	Ditto.
73	19 Jan. .. 37	Data Ram Doobé..	35 —	4	Ditto.
74	21 Jan. .. 37	Ram Churn Hullwae....	6 —	1	Ditto.
75	2 Feb. .. 37	Nokool Pouey..	60 —	3	Ditto.
76	1 April .. 37	Toorab Moosulman ..	25 —	5	Ditto.
77	14 April .. 37	Soorja Munnie.....	60 —	0	Ditto.
78	Sep. .. 37	A Brabmun child.....	3 —	2	Ditto.

At the Hospital temporarily established by me in Calcutta. } These cases have occurred chiefly at Cawnpore, Meerut, Sheehjehanpore and Mooradabad.

Annual Report of Surgical and Medical diseases in the Central Hospital and Hospital of Surgery, from 17th December, 1836, to 28th December, 1837.

Diseases.		Total.
Abcess, internal..		13
Do. External.....		191
Adipose tumour..		12
Bubo.....		404
Cancer.....		13
Contraction of the Arm..		2
Do. fingers from burn.....		2
Do. of the neck.....		2
Cancer of lip.....		1
Do. of Penis..... operation.....		2
Do. of Fingers..... ditto.....		1
Do. of Nose and Cheek..... ditto.....		1
Cutaneous diseases.....		31
Dislocations and Spraios.....		92
Extirpation of parotid gland—the Carotid Artery tied.....		2
Do. Tumour of neck dissected off from Carotid Artery and par Vagum, the internal and ext. Jugular Veins being wounded.....		1
Do. Tumour of hand. The brachial Artery tied.....		2
Do. of the thigh, weight 20lb. Circumference 24 Inch length 26 inches removed, femoral artery tied.....		1
Elephantiasis.....		28
Do. of the prepuce removed.....		3
Fractures.....		62
Furunculus.....		349
Fungus hæmatodes.....		2
Gonorrhœa.....		630
Hydrocele.....operations.....		289
Hare-lip.....ditto.....		3
Hypertrophy of the Scrotum and Penis removed.....		8
Do. Do. weighing..... 57lb		1
Do. Do. Do. 48 „		2
Do. Do. Do. 47 „		1
Do. Do. Do. 30 „		1
Do. Do. Do. 30 „		4
Do. Do. Do. 12 „		3
Hernia operation.....		2
Hemorrhoids removed.....		73
Leprosy.....		151
Noli me tangere.....		6
New lips and Nose. } Autoplastic Operations.....		3
Do. Nose. }		2
Do. Cheek. }		5
Otitis.....		227
Odontalgia.....		185
Papula.....		15
Polypus.....		12
Porrigio.....		255
Psora.....		236
Phymosis.....		61
Do. prepuce removed..		3
Shark bite..		1
Stone of bladder (operations).....		6
Scrofulous disease of the Knee Joint amputation..		3
Syphilis..		1715

		Diseases.	Total.
Ophthalmic diseases 2217.		Ulcers.. .. .	1284
		Ulcerated Nose.. .. .	43
		Wen.. .. .	38
		Wounds and accidents.. .. .	167
		Other diseases.. .. .	91
		Amaurosis.. .. .	77
		Cataract operations.. .. .	261
		Closed pupil, ditto.. .. .	26
		Ectropion and Entropion ditto.. .. .	11
		Fistula lachrymalis operation.....	36
		Foreign body in Cornea.. .. .	11
		Glaucoma.....	126
		Hypopyon.. .. .	23
		Inflammation of the lachrymal Sac....	12
		Do. Eye lid.. .. .	15
		Injury of Globe.. .. .	13
		Iritis.. .. .	17
		Leucoma	85
		Nebulus Cornea.. .. .	148
		Nyctalopia.. .. .	233
		Ophthalmia.. .. .	698
		Do. Purulenta....	18
		Do. with ulcer of Cornea....	7
		Pterygium....	49
		Staphyloma	57
		Suppuration of the Globe.. .. .	29
		Tinea Ciliaris.. .. .	23
		Tumour of lid.. .. .	17
		Trichiasis.. .. .	93
		Ulcer of Cornea.. .. .	132
		Apoplexy.. .. .	18
		Asthma.. .. .	237
		Affections of the urinary organs.. .. .	10
		Cholera.. .. .	17
		Cnchexia.. .. .	6
		Cephalalgia.. .. .	442
		Dysuria.. .. .	16
		Diarrhoea.. .. .	445
		Dropsical affections.. .. .	30
		Dysentery.. .. .	540
		Delirium tremens.. .. .	9
		Fevers—Remittent and Intermittent.. .. .	1108
		Hepatic affections—Acute and Chronic.. .. .	67
		External.. .. .	74
		Cephalic.. .. .	12
		Thoracic	117
		Abdominal.. .. .	231
		Mania.. .. .	41
		Paralysis.. .. .	88
		Phthisis Pulmonalis.. .. .	109
		Rheumatism.. .. .	1351
		Spleen.. .. .	185
		Small Pox.. .. .	6
		Éric douloureux.. .. .	7
		Anomalus.. .. .	137
Grand Total... .. .			14,171

Such was its success that many interesting cases came from Burdwan, Pubna, Kulna, Jessore, Cuttack, and various other towns in Bengal, and, so far as I can ascertain, the Natives of Calcutta greatly regretted the downfall of the hospital, and are anxious for its restoration. After that period the Institution ceased, and my career since that time has been with the Governor General in the Upper Provinces of India.

Calcutta, 19th May 1840.

Indian Operation for the Stone.

The patient was seated on the lap of an Assistant, with his back towards the Assistant's face. The hands were secured under his hams, the thighs being bent at the acutest possible angle, and the knees likewise.

The operator commenced by kneading the abdomen, with his hands, well lubricated with oil, and pressing the bladder, moderately distended with urine, from the Hypogastric Region, downwards towards the outlet of the Pelvis; and keeping up the pressure with his right hand, he introduced the fore and middle fingers of his left hand into the rectum, as deep as possible, grasping the stone behind the base of the prostate gland, and drawing the stone to the Perineum, where it made a distinct projection.

A *packing* needle was then employed, by plunging it into the perineum, striking the stone, and removing all doubt of the presence of the Calculus in perineo, before attempting any incision. These efforts were attended with a considerable deal of dragging and distention of the internal parts.

Inclining the patient more towards the horizontal, he now commenced the incision a little to the left of the Raphe, making repeated and hesitating cuts. I introduced a sharp scalpel into his hand and induced him to enlarge the incision considerably. When he had so done he passed the hooked extremity of a vectis behind the stone, and by a digging effort, and applying the power to the handle, using the arch of the pubis as the prop, he, by main force, started out the stone, breaking it however, into a number of pieces; the calculus was soft, of the friable description.

I endeavoured to mitigate the sufferings of the patient by all the suggestion I could make, and had I not insisted on larger and bolder incisions being made, or allowed the vectis to be introduced until they were completed; or had I not checked his hand when using the latter to force out the stone with great violence, fatal consequences, perhaps, might have ensued. The European instruments were shewn him, and he acknowledged their infinite superiority. A native operator confessed that the average mortality was 40 per cent.

CAMEL LITTERS.

The following is a description of a contrivance for the conveyance of the sick which suggested itself as a substitute for that of hackeries. In the latter the unfortunate patients are jolted from day break till about 1 or 2 o'clock in the afternoon, being thus exposed during the hottest part of the day in this slow and inconvenient mode of conveyance. By the present method the patients are brought to their ground by 9 or 10 o'clock, in a far easier and more agreeable manner, and the sick list is diminished. Slight cases recover more rapidly.

The expense is not much greater than that of a hackery. Four camels with their Litters, at the usual rate paid in the Governor General's Camp, amount to 32 Rs., two of which might each convey a pair of long litters. Thus :

	men	Rs.	per	ensem
Two camels carrying 4 litters for weaker patients	4 at 8 = 16	„	„	„
Two do. each carrying 4 patients in the sitting posture.. .. .	8 at 8	16	„	„
Total.....	12 „	„	32	„

These litters are not only an advantageous substitute for hackeries, but they also supersede the necessity of Doolies in a great measure. Doolies would be only requisite for fracture cases, dysenteric affections, and cases of extreme debility. For ordinary cases of fever, and other diseases, Litters will answer every purpose, and the supply of Doolies being limited to two, as well as being expensive, it is a great advantage to be able to supply eight litters for something less than the monthly expense of one Doolie.

A number of these litters would be of great advantage to an army in the field, as bearers are apt to run away in time of danger. By means of these any medical officer is enabled at a small expense to carry a poor patient of the neighbouring town or village on whom he may have occasion to perform any serious surgical operation, in his route, and who requires to be watched for a certain time.

A whole family might travel from any part of Upper India to Bombay on one camel, or at most on two pair of litters, and one pair for servants. It would also be a very convenient mode of travelling across the Isthmus of Suez.

A sick officer might travel comfortably from 30 to 40 miles every night to the Hills or elsewhere for change of air, carrying a Khitmutgar, and all necessary supplies. The servant can wait upon him across the camel, whilst it is in progression. It is not the least advantage that the traveller is saved the annoyance and broken sleep at every stage in Dak travelling by the bearers. The difference of expense forms no small part of the advantage to a subaltern officer.

After all the "*Experimentum crucis*" is the only test of the merits of the contrivance, and I have the pleasure to add that the Troopers of the Right Hon'ble the Governor General's Body Guard are highly pleased with this new conveyance. The experiment has succeeded in every way as the most comfortable and safe mode of invalid travelling I have heard or read of.

DESCRIPTION.

The parts marked *a, b, c*, (See plate xvi fig. 1) are the bars of the frame; the cross bars *d d* are to support the top *e*, which is covered with doosootie cloth and painted white. The whole part above the bar, *a*, and also in front as low as the bar *b*, to be covered by a curtain like a Doolie cover, only the part near the camel to come down as far as the higher part of bar *a*.—The part of the litter below the bar *b*, to be corded. The back part to be covered with plain doosootie.—The front and the sides as high as *a* to be covered with doosootie afterwards painted black.

The whole to be lined inside with cushions.

When the cover is on, the whole machine will appear, if viewed from the off side, like a Doolie without the pole.

The next diagram is sketch of the trunk without the awning and curtains. (See plate, fig. 2d.)—The parts marked *a* and *b* are covered all with strong tent cloth varnished black.—The parts marked *d* are covered with red cloth inside. The parts marked *c* and *e* with open cane work—and, if wished, the whole of *c* likewise lined with red kurwa cushions.

In fig. 1 the shading marks iron hands which afford very considerable strength in the direction of the strain, whilst they enable the wooden framework to be made extremely light. The litters are buckled on precisely in the same manner as camel trunks by means of thick straps made of Buffalo hides. *Four strong iron hooks*, two on each litter, at *d, d*, and a chain, will perhaps be preferable, and equally secure as the straps, when fastened over the "pullan" or saddle, and will give the patient more room, by doing away with the necessity of the straps. A pad is placed between the litter and the camel to prevent the former chafing the animal's sides. Four men can travel in the two camel litters if the camel is a strong one, or two in the horizontal posture.

Figure 3 represents the apparatus *without* the straps. In the act, of sitting down, the animal descends first on its knees, and then on its haunches, by which it is perceived that the head of the patient is never lowered, and the degree of jolting attending the rising and sitting of the camel is very trifling, owing to the elasticity of the sacking, and the spring of the animal's joints.

The litter is not only supported by means of the strong leather straps *a a*, or the iron hooks and chain before explained, but likewise by a strong rope *b, b*,

passed through iron rings *c, c,* on each side, and crossed over the saddle or pullan.

The natives have given these conveyances the name of 'Kujjawas' from a kind of hamper used in Afghanistan, and on which fruit is sometimes conveyed to India, and I have since learnt that men often travel in them, though I was not aware of this circumstance when the idea of camel *doolies* suggested itself to me.

Fig. 4 exhibits the machine attached to the camel *with* straps.

These litters were planned and completed by me before I heard of any such a measure being adopted with the Army of the Indus, and I contrived them exclusively for the *sick on the line of march*. I have since heard from Lt. Col. Warren and other officers that the conveyances with the Army of the Indus were nothing more than common 'kujjawas' or panniers, such as were employed by Baron Larrey in the campaign of the French army in Syria. Colonel Warren describes them as horrible, as conveyances for the sick, and, so far as I can ascertain, they bear no resemblance to the litters here represented. I have likewise been informed by Lieut. Gaitskell that these litters much resemble those used by the natives of Egypt for travelling; which circumstance, so far from militating against my contrivance only shews that the principle is a good one; an adaptation of means to an end, the result of circumstances occurring to one who has been frequently with a marching army, and which I dare say has occurred to others under similar circumstances in different parts of the world. If we may compare small things with great, Haller, Albinus, Wachendorf, and Dr. William Hunter discovered the *membrana pupillaris* at the same time without correspondence with each other,

F. H. BRETT.

Camp Paneeput, 18th November 1839.

THE END.

OMISSIONS AND ERRATA.

Page	1 lines	5 & 6 (Preface)	for per-user	read peru-ser.
—	3	13	— established	— establish.
—	4	19	— moved	— removed.
—	16	2	after affected	insert ,
—	—	19	— circulation	— ,
—	27	4	— subsidence	— ,
and so on throughout sentence.				
—	29	19	for differs	read differ.
—	33	2	— late	— late.
—	42	7	— Europeans	— European.
—	—	8	— adopt	— adapt.
—	—	24	— exercising	— exercises.
—	53	26	after posture, for (.)	read ;
—	55	28	for sensible ,,	— insensible
—	58	3	omit the and for "lower the"	read "the lower"
—	91	1	for membranes	read membranes
—	97	15	— preseveration	— preservation
—	101	27	— firm	— few
—	106	19	after mostriils	read and antrum
—	125	13	for have	read leave
—	133	3	— affects	— affection
—	141	11	— cause	— causes
—	154	24	— edge	— edges
—	168	13	— guttation	— guttatim
—	186 lines 9 & 13	—	— phosphate	— phosphates
—	203	18	— cyst	— cysts
—	231 line	10	— expeditions	— expeditious
—	234	8	omit the word "Sec. I."	
—	263	12	for structure	read stricture
—	264	8	omit the word Sec.	
—	269	15	for Rectums	read Rectum
—	271	17	for dilate	read dilated
—	283 to 289	alter the heading according to that of the Paragraphs		
—	300	6	for on	read in
—	—	8	— retina	— retina
—	309	21	omit "singulorum partes æquales"	
—	312 lines 6 & 7	—	— of the menstrual or hæmorrhoidal dis-	charges.

OMISSIONS AND ERRATA—CONTINUED.

Page 313 line	7	omit " Inflammation of the conjunctiva."	
— 321 —	10	<i>for</i> onset	<i>read</i> stage
— 385 —	27	— lighting	— lightly
— 442 at the foot note.		<i>read</i> " Trettato delle principali Malattie degli occhi" &c.	
— 474 line	3	<i>for</i> formed	<i>read</i> performed

Fig. I.

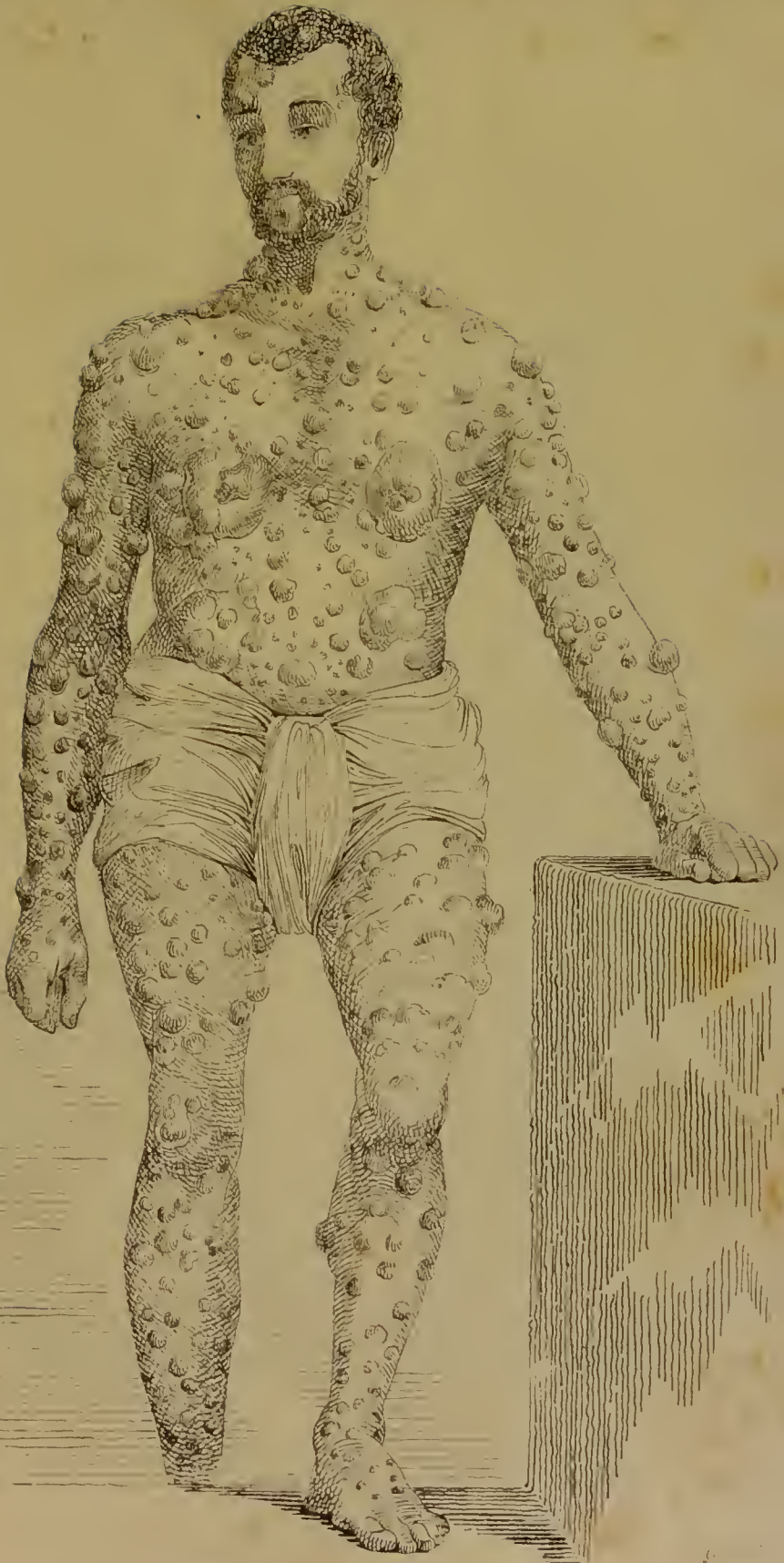


Fig. II.













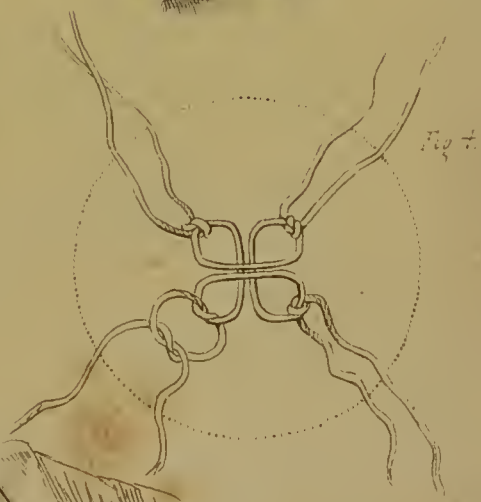
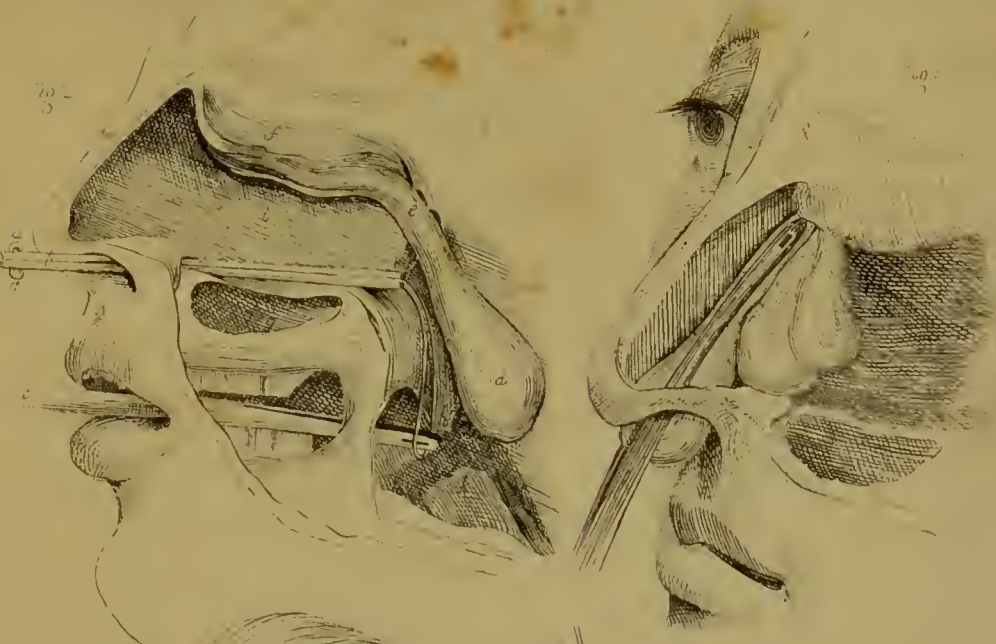


Fig. 5





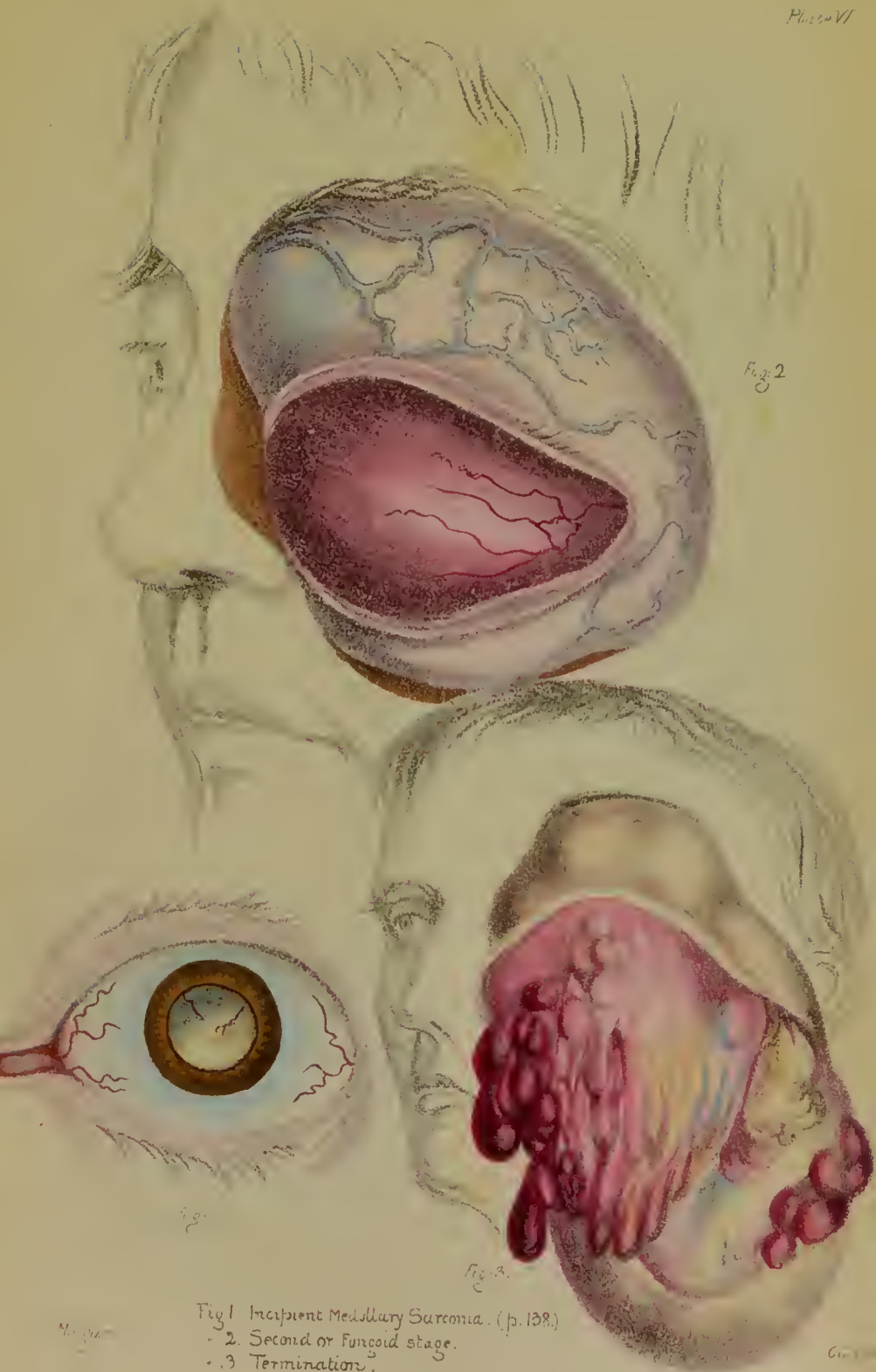


Fig 1. Incipient Medullary Sarcoma. (p. 138.)
 2. Second or fungoid stage.
 3. Termination.

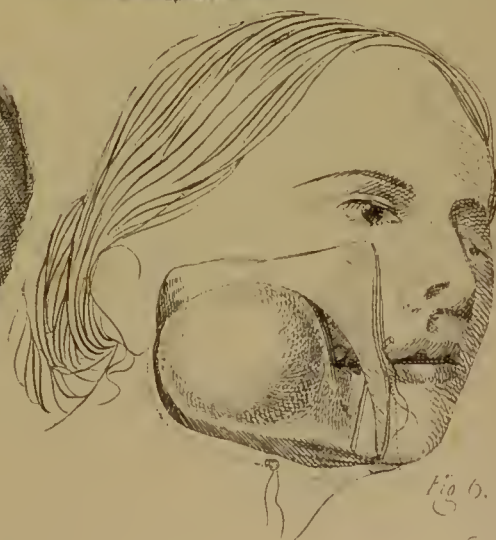
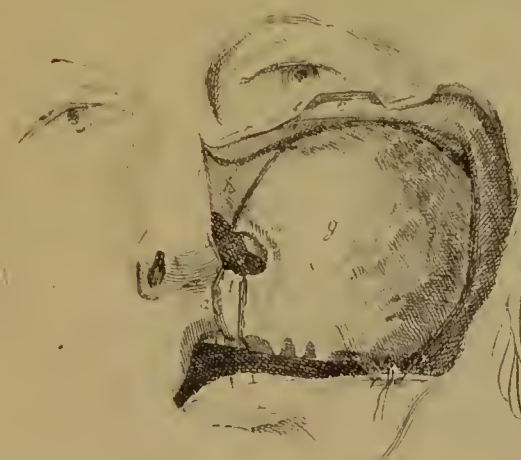


Fig. 1
&

Fig. 2
&

Fig. 6.

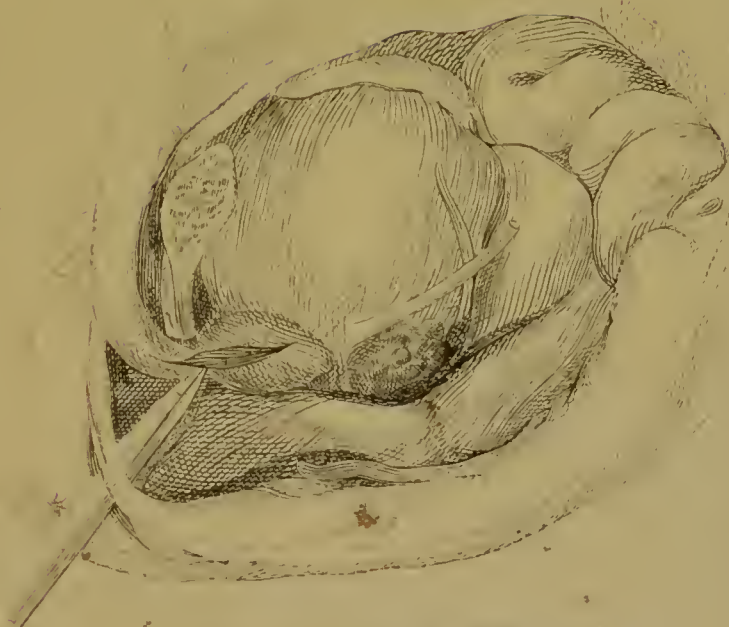


Fig. 5.

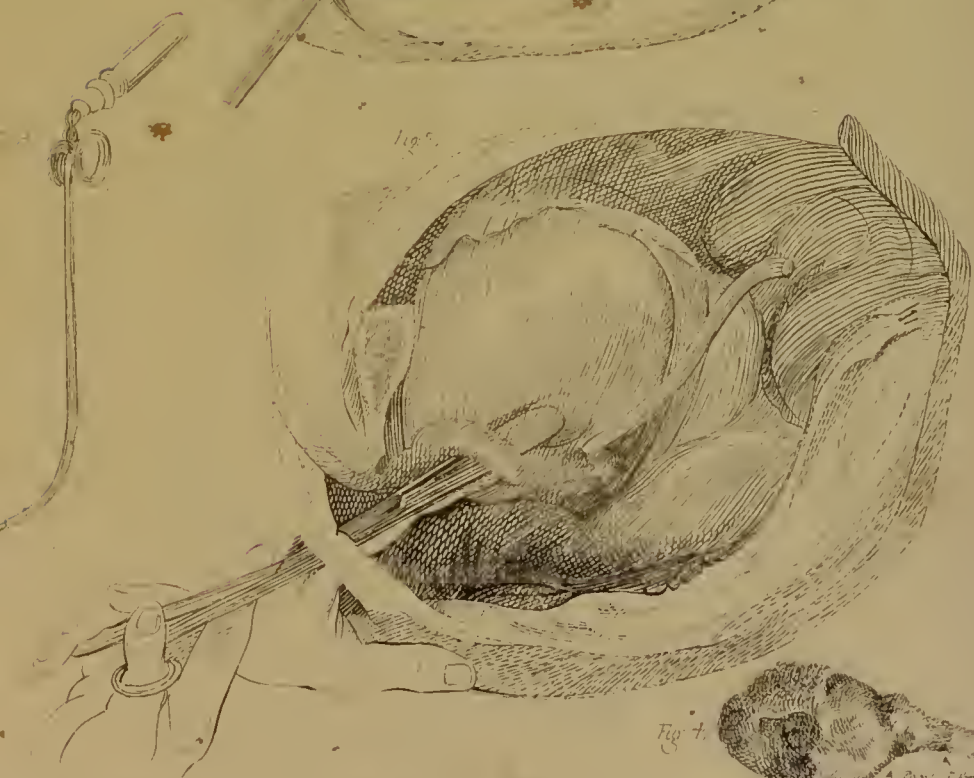
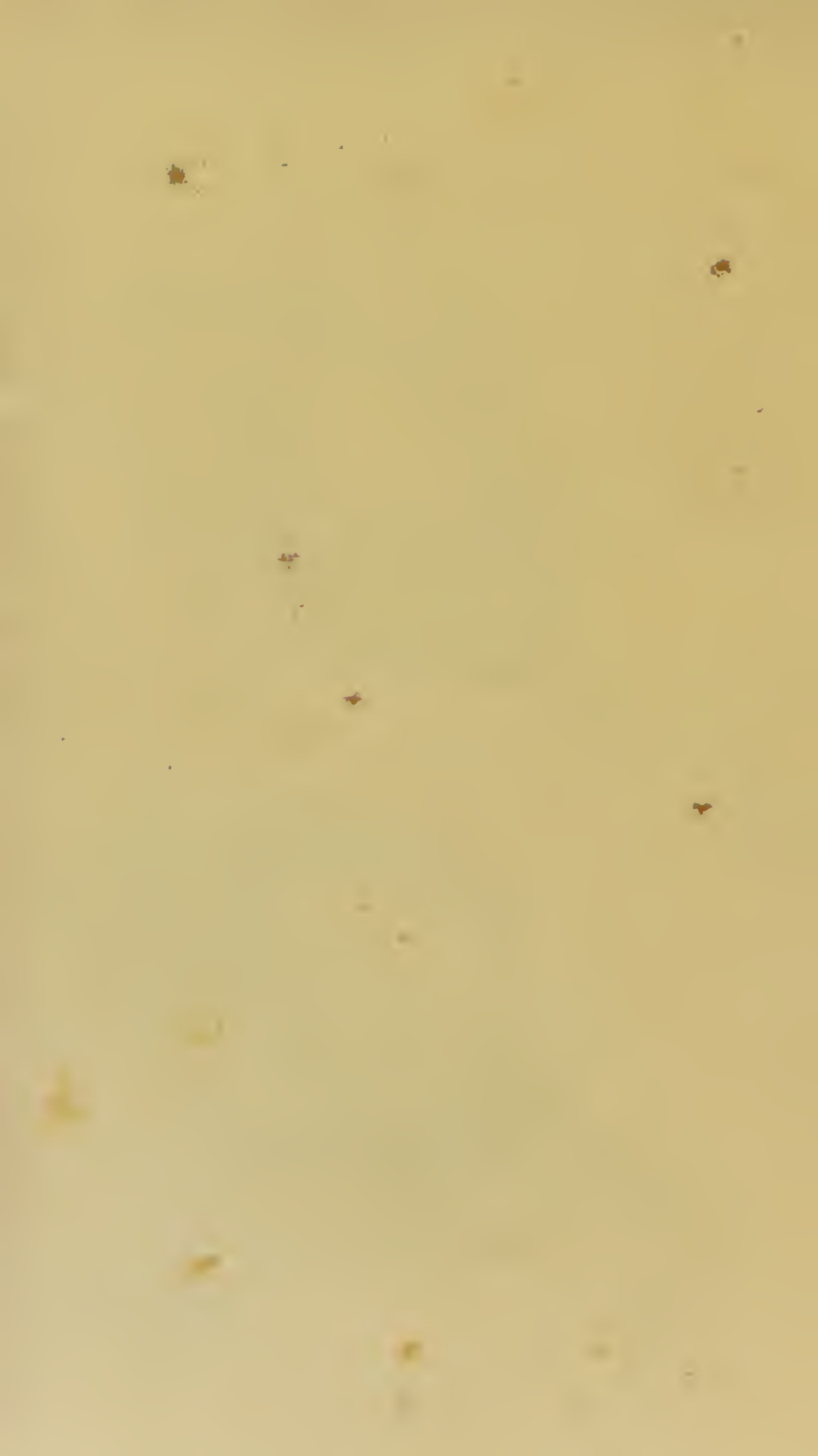


Fig. 7.



A. Part of the organ
B. Ligament of the organ



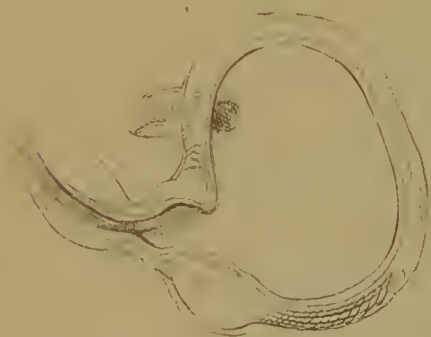
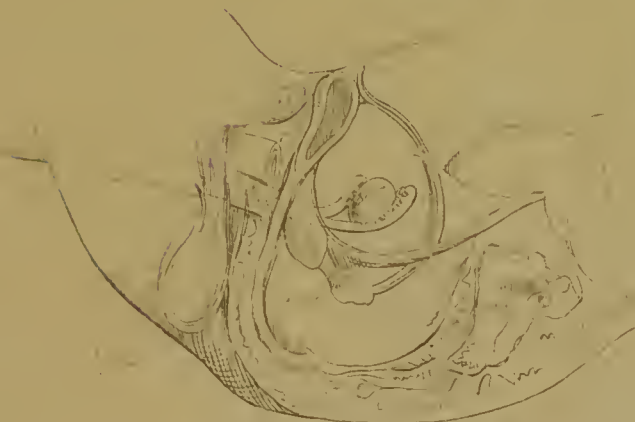
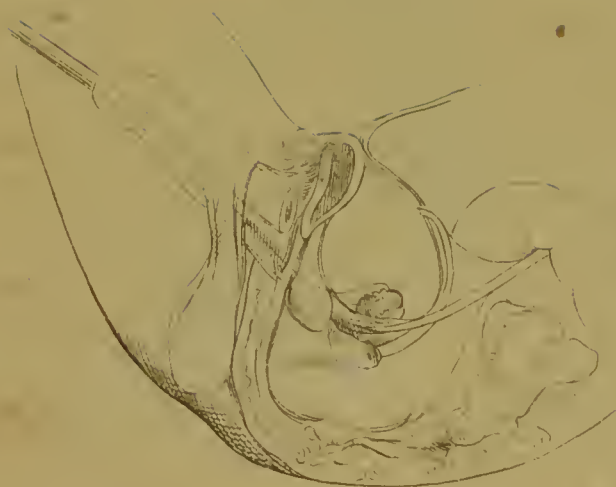


Fig. 5.



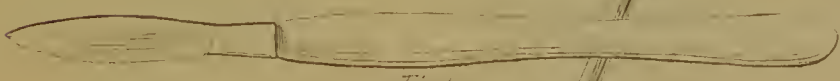
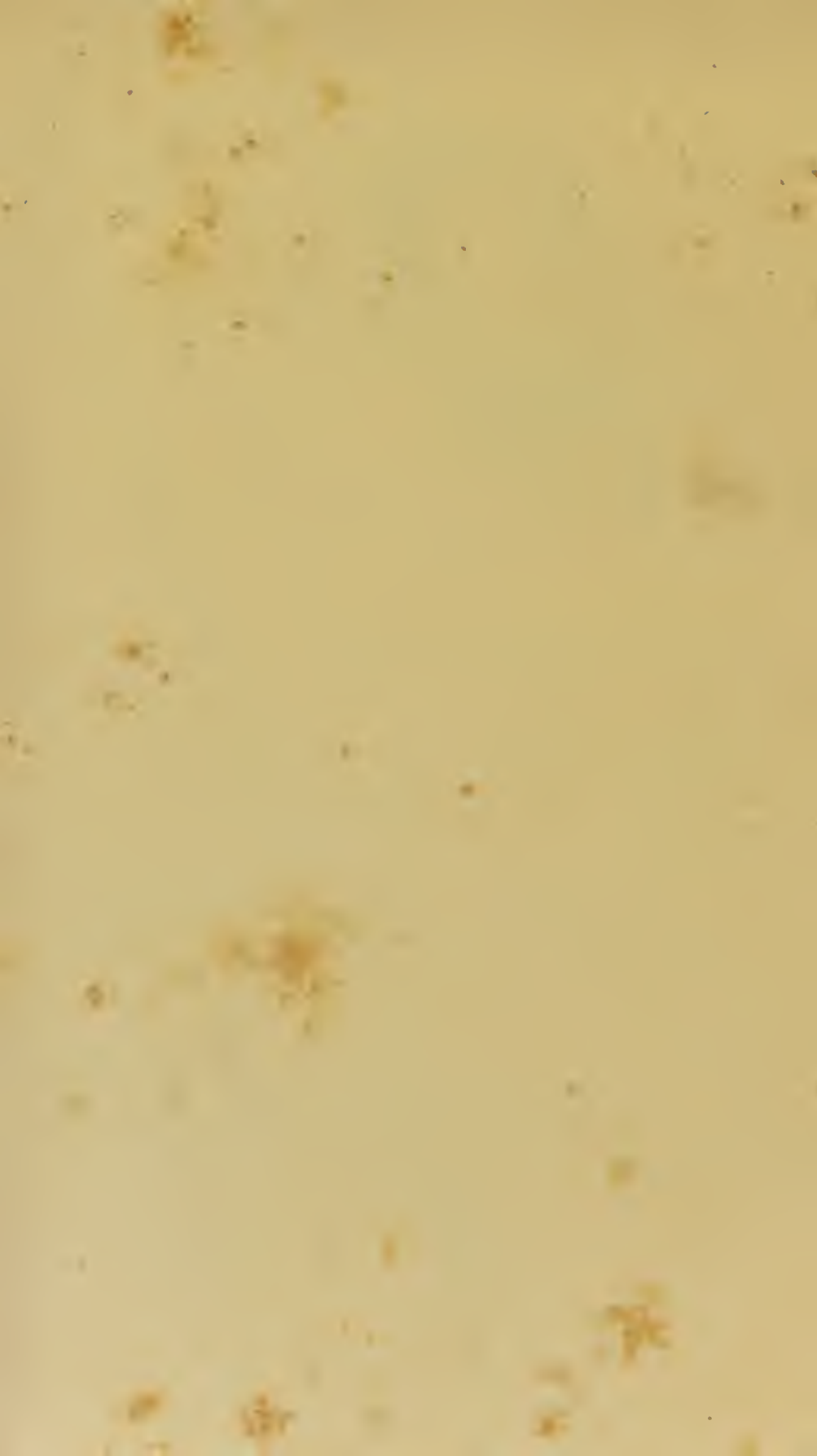
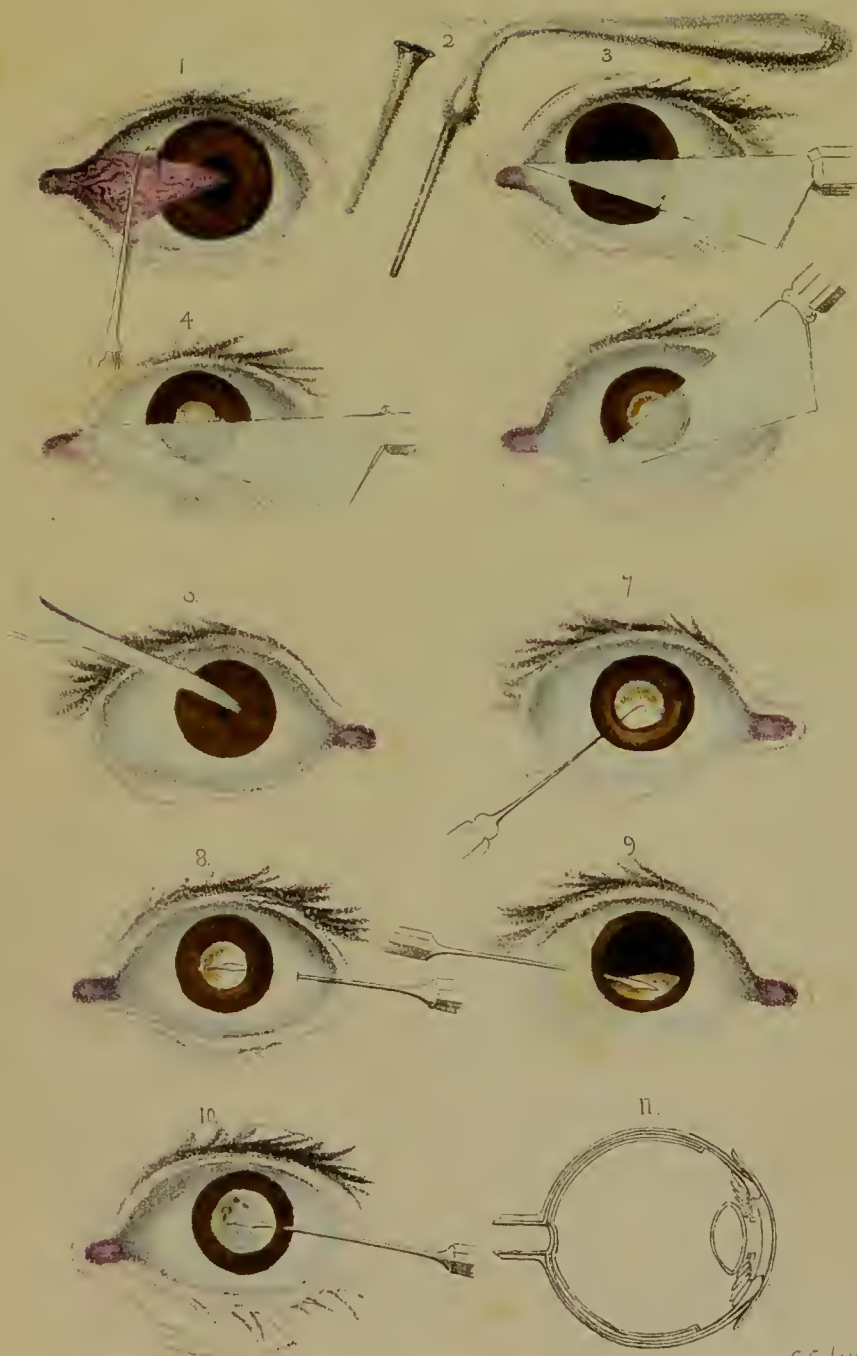


Fig. 6.
Instrumentum...





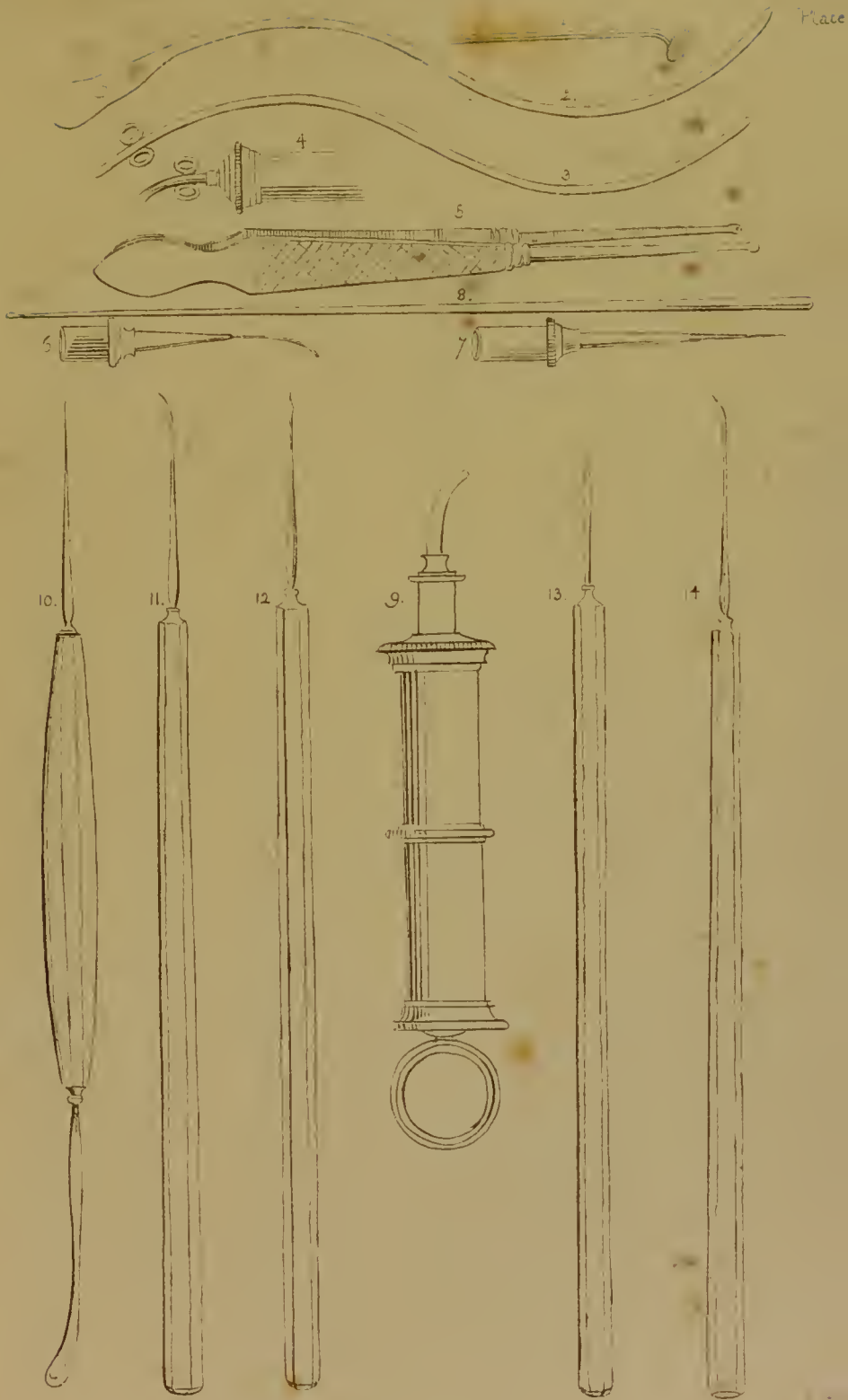
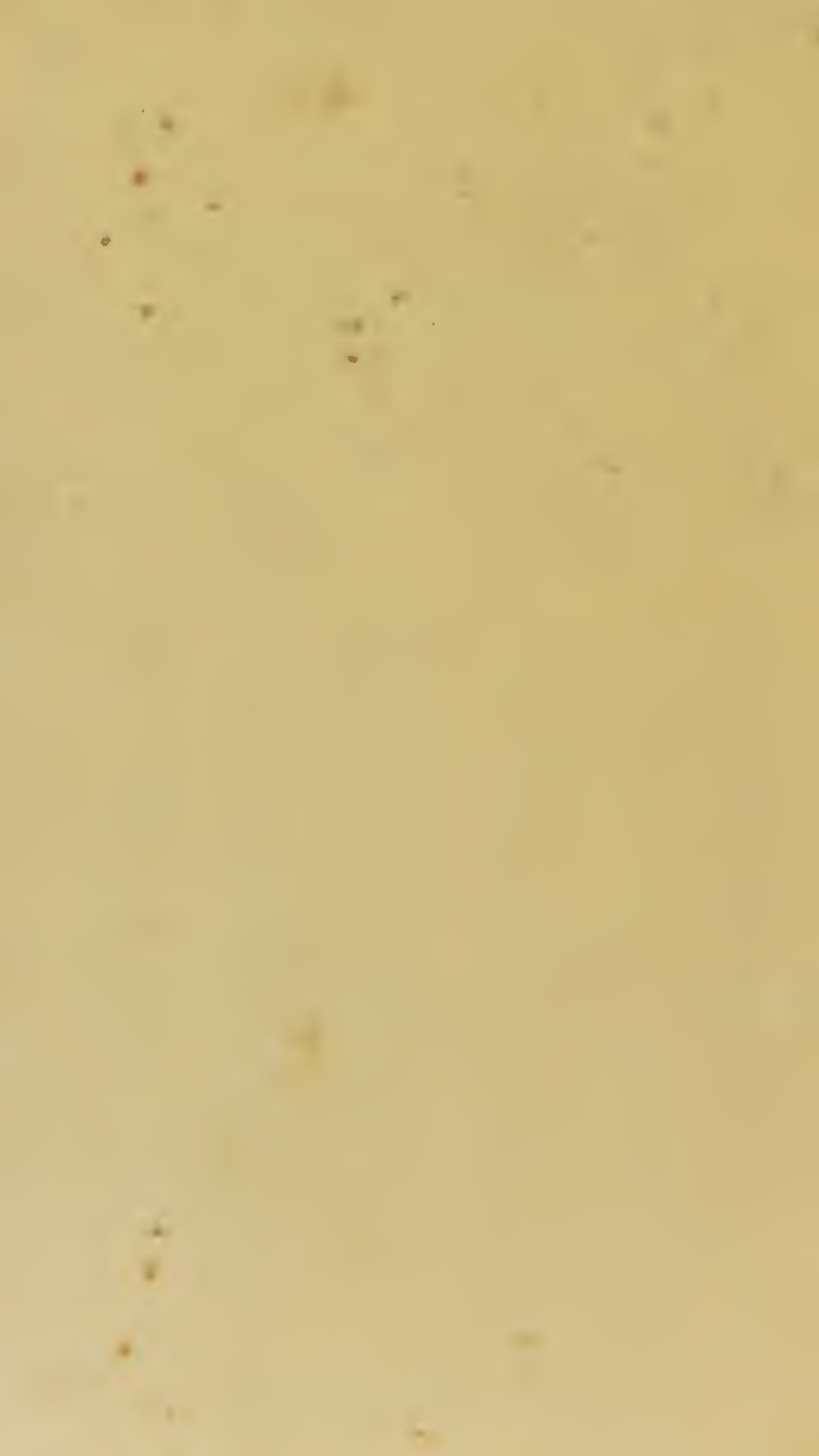
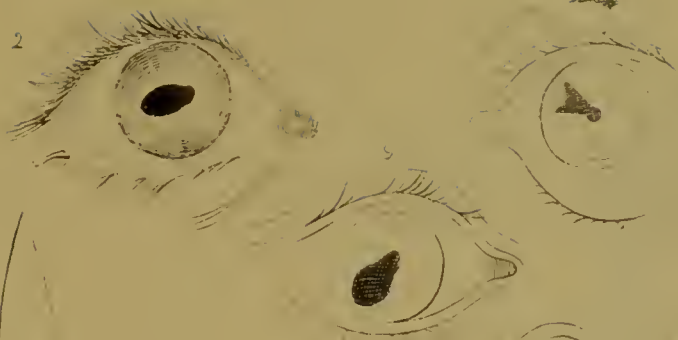


Fig 11. SCARPAS' Needle, side view. Fig 12. BEERS' Needle.
 Fig 13 For Posterior Division Fig 14 For Anterior Division.



2



1.



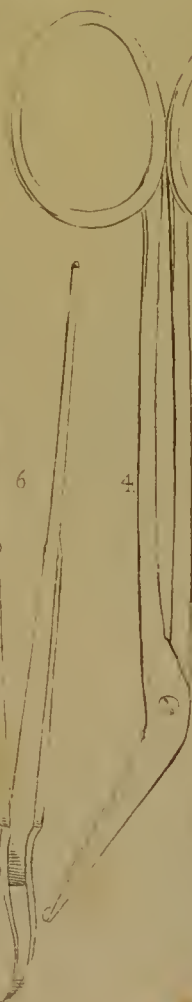
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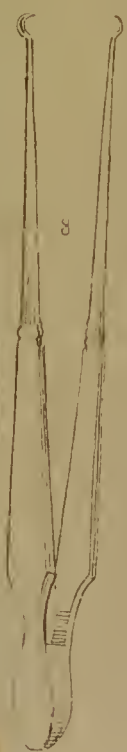
6



4.



8



C. W. May 72

